Los Gatos Creek

A master plan for environmental redevelopment

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Los Gatos Creek

A master plan for environmental redevelopment

Prepared for the
Santa Clara Valley Water District

Royston Hanamoto Beck & Abey
Landscape Architects & Planners
50 Green Street
San Francisco, California

November 20, 1974

Board of Directors
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, California 95118

Gentlemen:

In accordance with our Agreement No. A008 with the Santa Clara Valley Water District, we are pleased to submit this Master Plan for Los Gatos Creek. The plan was developed for a 2.5 mile section of Los Gatos Creek from Campbell Avenue south to the percolation pond area past San Tomas Avenue. The plan was developed with the assistance of the Los Gatos Creek Development Committee, State, City and other local agencies, interested officials and citizens. Working within the various constraints in the area, the Master Plan reflects the desires of the residents of the community for developing this section of Los Gatos Creek.

We wish to express our appreciation to the Los Gatos Creek Committee, Los Gatos Creek Committee of the Audubon Society, and the staff members of the various departments and agencies at both State and local levels who gave us help and encouragement during the course of our study, with special thanks to Mr. George Korbay and Mr. Ed Ferguson of the Water District for their valuable aid. This Master Plan is the initial step toward development of the area into a pleasant environment suitable for recreation use and for re-establishment of some of the native fauna through habitat improvement.

While acknowledging the importance of the water conservation functions of the area, this Master Plan endeavors to develop a pleasant environment conducive to recreation and wildlife, and a visual amenity to the park user, community and passer-by.

It will hopefully fulfill some of the recreational needs of the community and become an integral link in the overall open space-recreation element for the community.

Sincerely,

ROYSTON, HANAMOTO, BECK & ABEY
Asa Hanamoto
Asa Hanamoto
tm

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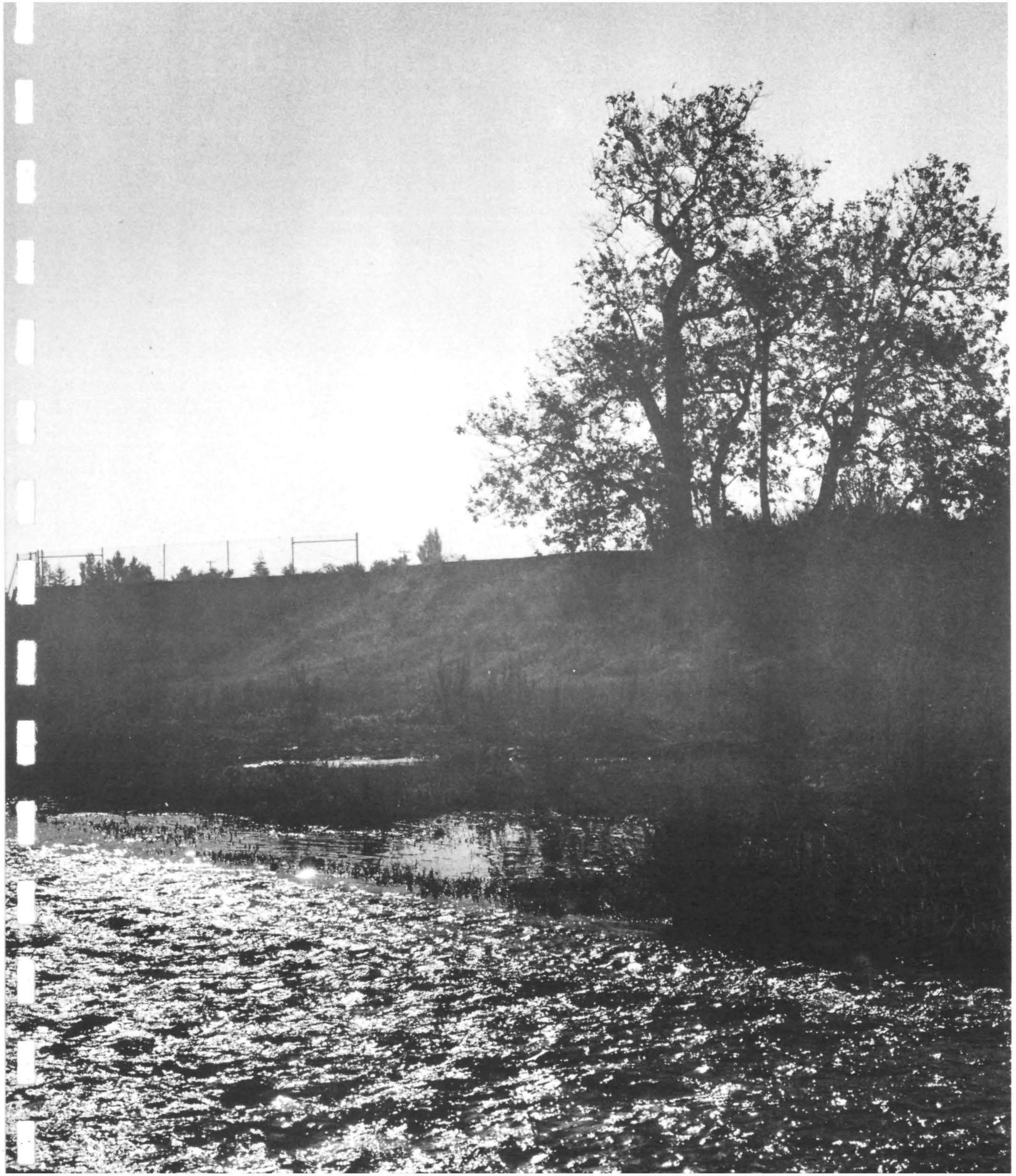

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Introduction

The Santa Clara Valley Water District is a Special District created by an act of the State Legislature. In 1968, the District was enlarged through the consolidation of two Special Districts: the Santa Clara Valley Water Conservation District, formed in 1929, and the Santa Clara County Flood Control and Water District, formed in 1951.

Water management programs of the District affect nearly everyone in the Santa Clara Valley, from Gilroy to Palo Alto. Operations include storage of rainwater in local reservoirs; percolation of water into underground basins; importation and treatment of water; planning for adequate future water supplies; and protection of life and property from floods.

The District is governed by seven directors. Five are elected by public vote, and two are appointed by the County Supervisors

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Nine committees and commissions advise the Board, and public meetings and hearings are held in various communities from time to time.

In the Spring of 1971, the firm of Royston, Hanamoto, Beck & Abey was retained by the Santa Clara Valley Water District (formerly the Santa Clara County Flood Control and Water District) to provide a Landscape Design Guide for District facilities throughout the Santa Clara Valley. The guide was intended to stimulate interest in the environmental enrichment of flood channel improvements, and recommended alternative design approaches for aesthetic treatment of existing and proposed flood control facilities. Completed in July 1972, this report included alternatives for channel modification, fencing, paving textures, maintenance guidelines, irrigation and planting.

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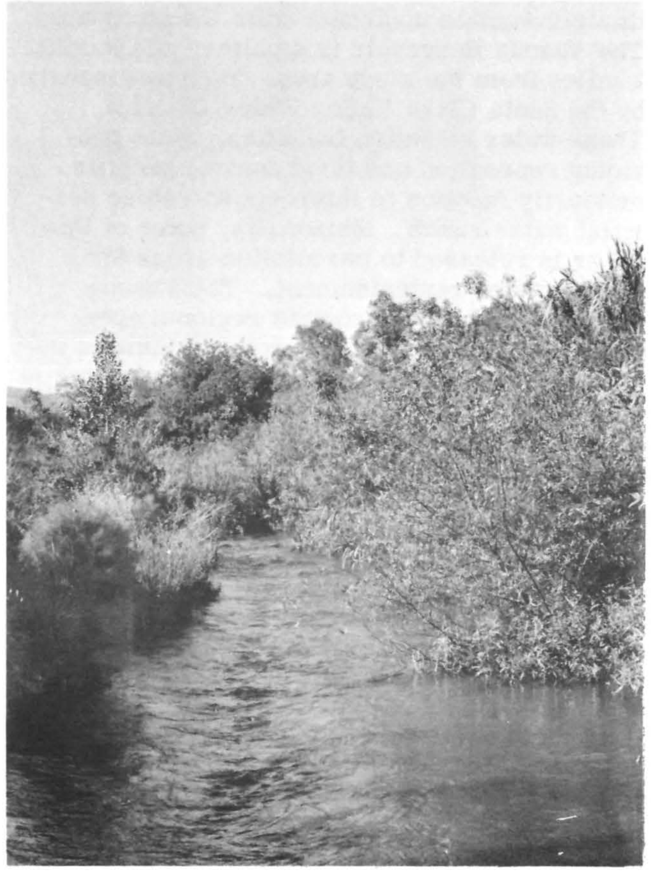
In addition to the preparation of the Landscape Design Guide, the Consultants were requested to prepare a Master Plan for landscape treatment of Los Gatos Creek between Campbell Avenue and Kirk Dam. The following is a report of the Master Plan study, and culminates a developmental process involving numerous public agencies and interested citizens of Santa Clara County. Its completion is a tribute to the consistent concern and interest for a program of beautification and enrichment for this reach of Los Gatos Creek.



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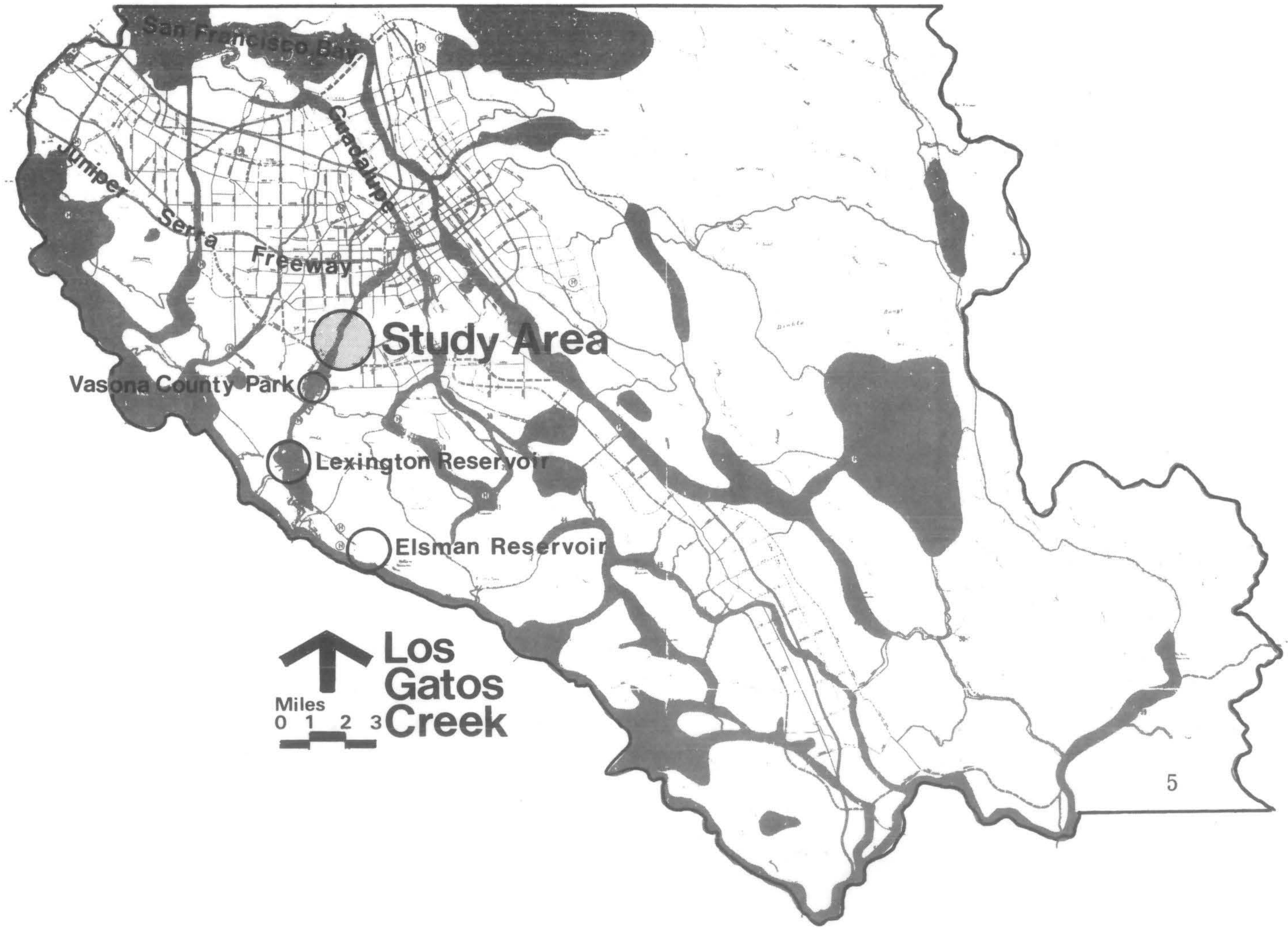
Regional and Local Orientation

Regionally, Los Gatos Creek is one of five major streams descending from the Santa Cruz Mountains in southwestern Santa Clara County. The creek system flows in a northerly direction, eventually joining the Guadalupe River and emptying into the San Francisco Bay. Approximate distance from its origin to confluence with the Guadalupe River is 18 miles. The creek is the major tributary for Elsman, Lexington, and Vasona reservoirs.

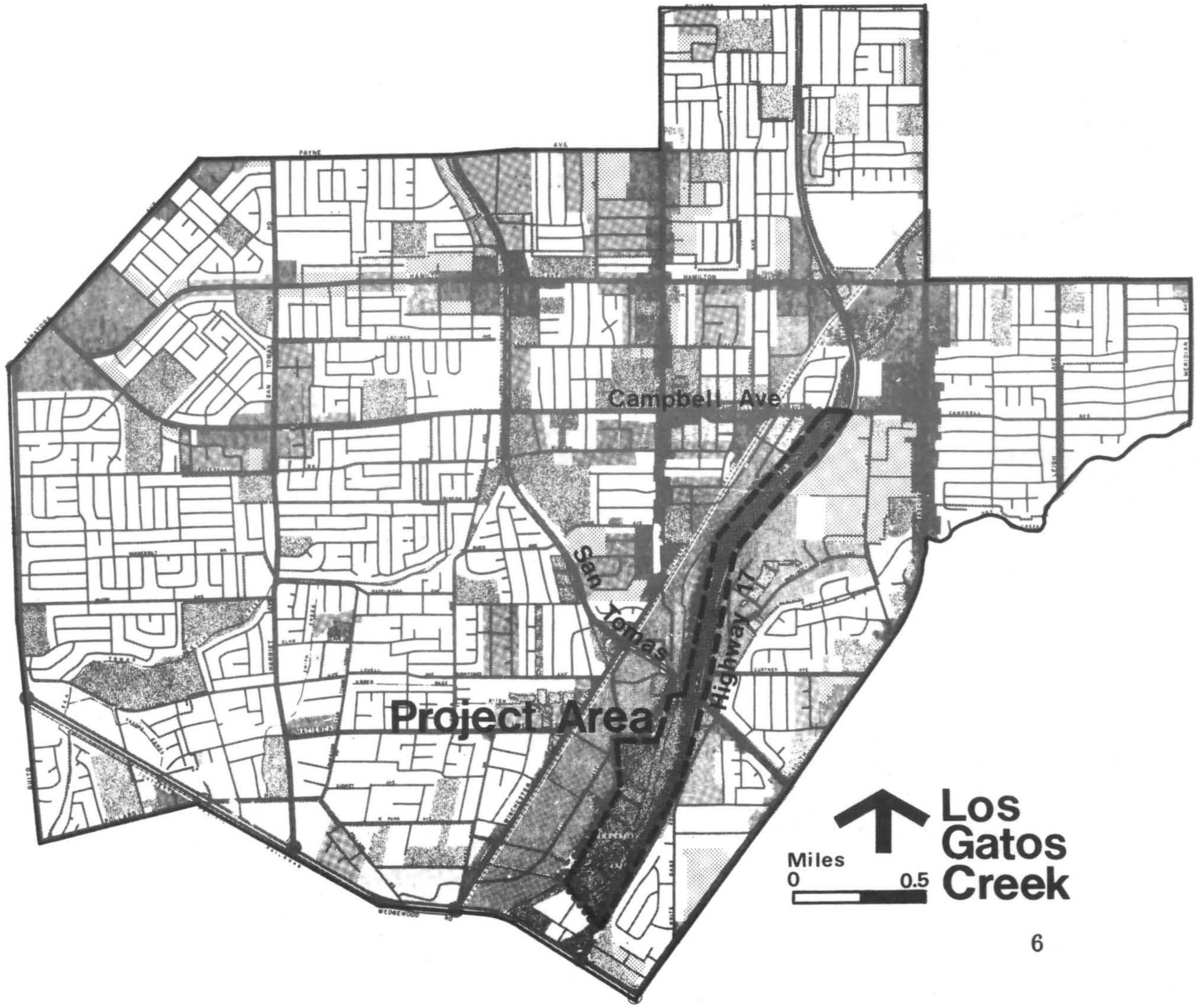
The Lexington Reservoir, a major storage facility of 20,200 acre feet, is located approximately 4 miles upstream from the study area. The Vasona Reservoir is smaller, and located 2 miles from the study area. Both are managed by the Santa Clara Valley Water District. These water retention facilities, while providing recreation and flood control benefits, primarily function to intercept and store seasonal water runoff. Seasonally, some of this water is released to percolation areas for ground water replenishment. The Vasona County Park is an important regional open space and recreation resource. Activities include fishing, boating, hiking and picnicking in a natural setting. The park is also a significant wildlife and waterfowl refuge.

The area of focus for this study is a 2.5 mile reach of Los Gatos Creek located about 2 miles downstream from Vasona County Park. Kirk Dam, a small intercept facility which diverts water to percolation areas, represents the southern boundary of the study area. Moving downstream, the area of study extends northward to Campbell Avenue. In addition to the immediate creek environs, the study area encompasses nearly 55 acres of land presently utilized for percolation and groundwater recharge ponds. These ponds are located on

Santa Clara County



Local Orientation



each side of Los Gatos Creek, three on the west side and four on the east side, in the vicinity of Kirk Dam and Los Gatos Creek County Park. The entire study area is within the City of Campbell city limits.

The residents in this area are well aware of the creek's presence. The study area for the creek and pond facilities is adjacent to Highway 17, and it is prominently visible to thousands of motorists traveling this freeway. Automobile travel time (exposure) along this portion of the freeway is approximately 2.5 minutes. The terrain and alignment of the freeway permit constant viewing of the creek environment for both north and south bound highway travelers. The creek is also highly visible from Los Gatos Creek County Park near San Tomas Expressway and from the various industrial complexes bordering on the west boundary of the study area.

Immediately south of the study area, the creek is within the Town of Los Gatos, and to the north of the study area, the creek continues for three-fourths of a mile within the City of Campbell, and then enters the City of San Jose. The Campbell community is intimately concerned with beautification proposals for this reach of the creek, and the City of Campbell has been most energetic in stimulating creek environmental improvements.

History

The streambed of Los Gatos Creek south of Campbell Avenue has been subject to many alterations for the purposes of obtaining water and gravel since the mid 1850's. An extensive system of gravity irrigation dams and canals had their origin in this region of the creek. At the height of these irrigation canal operations in the early 1900's, there were approximately 25 miles of canals capable of serving a maximum of about 10,000 acres with irrigation water. Two public ditch companies and one private ditch company operated from the creekbed.

The oldest ditch that diverted water from the creekbed was known as the Kirk Ditch. It was owned and operated by an association of about 25 farmers. This ditch was built around 1857 and supplied water from an area east of Los Gatos Creek to the Willow Glen area of San Jose. Kirk Ditch paralleled the old streambed of Los Gatos Creek now known as Dry Creek Road. It had a maximum flow capacity of about 40 cfs. The ditch supplied irrigation water to farmers until the mid 1960's when all of the adjacent agricultural land had been converted to home subdivisions. The owner of the irrigation system relinquished his water rights to the Santa Clara Valley Water District in 1966. A small portion of the original ditch is still being used to bring water to the McGlincy Percolation Ponds located just east of Highway 17.

The Santa Clara Valley Water Company operated approximately 10 miles of ditches, and diverted water from the creekbed in two locations. The main ditches of this system were known locally as the Duncan Ditch, the Statler Ditch, and the Upper Duncan Ditch. The original water rights for the Duncan Ditch were made in 1882, with a second appropriation granted in 1905. The Statler Ditch water rights were acquired in 1885. In 1903 the Santa Clara Valley Water Company was organized and took over operation of these ditches. At its peak in about 1905, the ditch system irrigated approximately 3,500 acres. This system gradually deteriorated as a result of several low rainfall years combined with new low-cost well water, and the system was abandoned in the early 1920's. The Santa Clara Valley Company rights were acquired by the Valley Water Conservation Association, and subsequently in February 1930, the Santa Clara Valley Water Conservation District acquired the rights.

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The third irrigation system was the Orchard Irrigation Company started by Mr. George Page of Campbell in about 1901. This company owned two ditches, and diverted water to the west bank of the creek at the present location of the Lower Page Drop Structure, and the Upper Page Dam on Los Gatos Creek. At their maximum, these ditches irrigated approximately 3,000 acres. This system had the lowest priority for water since it was the last to acquire rights and thus had to wait until the demands of the other companies were met. The Orchard Irrigation Company was absorbed by the Valley Water Conservation Association in the 1920's and then by the Santa Clara Valley Water Conservation District in 1930. W.P.A. funds were used to rebuild the original wooden flashboard dams just prior to the construction of Vasona Dam in 1935. The new Vasona Reservoir restored the potential use of these ditches for irrigation purposes. During the late 1950's and all through the 60's, much of the agricultural land served by the lower canal was urbanized, and the need for the lower canal depreciated. Also, during this time extensive gravel mining in the creekbed just below the Lower Page Dam greatly jeopardized the structural integrity of the dam, and it became apparent that the structure would need to be replaced. At this time the Santa Clara County Flood Control and Water District decided to complete long-range flood control improvements for this reach of the creekbed. Because irrigation demands were eliminated, it was possible to lower the crest of the Lower Page Dam to meet the required hydraulics of the upstream and downstream channel configurations. The Upper Page Dam also was rebuilt, and an intermediate drop structure was constructed between the two dams. Final flood control improvements, including demolition and reconstruction of the Upper and Lower Page Dams, were completed in the fall of 1970.

The Upper Page Ditch is still operated by the Santa Clara Valley Water District as a conveyor of water to the percolation ponds in the Campbell area.

Individual property owners along the creek sold gravel and mining rights as the need for gravel for construction in the valley increased. In 1957, when the Santa Clara Valley Water Conservation District passed a bond issue for increased percolation pond facilities, the District bought the Oak Lane pond sites, and then contracted with gravel companies to excavate the ponds.

The construction of California Highway 17 in the late 1950's, and the Santa Clara Valley Water District's 6 foot diameter Central Pipeline in the mid 1960's, have great impact on this portion of the creek. The highway essentially follows the floodplain of the creek as does the pipeline.

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Planning and Study Objectives

The purpose of this study has been to prepare a Landscape Master Plan for a 2.5 mile reach of Los Gatos Creek and related percolation pond areas. It was the intent of the Santa Clara Valley Water District that the Consultants establish a mutually benefiting rapport with local community groups and interested citizens. Development of goals and proposals for the creek has consistently involved reciprocal communication between the Los Gatos Creek Development Committee, State and City agencies, and interested citizens. The resulting growth of involvement has been encouragingly worthwhile in providing a process for public contribution and participation.

The study was divided into two phases. The first phase consisted of a comprehensive analysis and evaluation of existing parameters affecting the creek's environment. On-site observation revealed the major visual aspects of the creek experience, and significant influencing factors were field noted and graphically represented. Examination of existing surveys and construction plans revealed additional criteria affecting design alternatives. A specific program was developed to define use areas, modification zones, and planting concepts, and the creek was evaluated as a natural resource interrelated with the community.

The second phase of the study was the Master Plan development, and involved translation of environmental factors into comprehensive visual forms. Existing elements were weighed and evaluated, and alternatives developed. In developing a landscape image for the creek, the Master Plan specifically includes recommendations for alternative creek and pond alignments, earth mounding and reshaping, plant material concepts, and pedestrian and bicycle circulation systems.

Development Goals

The goals outlined below were formulated through discussion with the Santa Clara Valley Water District and participating local citizens.

1. Involvement of the community in the early design and development phase. This involvement stressed consideration of local opinion to achieve community desires.

2. Development of a plan which complements the County of Santa Clara's Urban Development/Open Space Plan adopted by the Policy Planning Committee in 1973. Particularly relevant policies developed within this document are outlined below:

    a. Streams should be protected from urban encroachment by establishment of "official plan lines" along streams, floodplain zoning, and public acquisition of streamsides. The creekside park concept should be implemented and all other appropriate devices which will preserve them in their natural state.

    b. A "full floodplain" or "limited floodplain" concept of flood control should be utilized wherever possible to maintain streams in their natural state.

    c. Plans for flood control projects, utility corridors, paths, and trails should take advantage of streamsides as connector opportunities between park and open space areas.

    d. Flood Control agencies should take scenic and environmental benefits into full consideration when computing costs of alternative methods of flood control.

    e. Methods should be instituted to allow jurisdictions to require utility companies and special purpose agencies to include accommodations for trail routes whenever they acquire easements and rights-of-way for their facilities.

    f. Potential groundwater recharge areas should be protected from urban encroachment by local land-use control jurisdictions.

    g. Water and recreation agencies should cooperate to maximize compatible recreational and scenic potentials of water percolation areas.

    h. When acquiring land for percolation facilities, sufficient area should be included for open space and recreation uses.

    i. Traditional rectilinear shapes for percolation ponds should be modified toward a more attractive, free form design so that they might be more aesthetically pleasing. Landscaping should be provided along the ponds as part of the Flood Control and Water District responsibility.

3. Recognition and integration with bicycle and trail route planning adopted by the Campbell and Los Gatos communities.

4. Development of the creek's environment to its optimum potential as a scenic/recreation corridor contributing to a community image or "sense of place."

5. Introduction of design elements intended to soften more severe and harsh man-made projects.

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6. Development of plant material scale and form for achieving integration with surrounding areas.

7. Development of a planting master plan for restoring native vegetation associated with this California region. The plan should recognize the habitat characteristics desirable for birds and wildlife. The planting master plan should serve as a guideline for plant selection as future development occurs.

8. Development of special areas or habitats designed to attract and re-establish wildlife displaced by earlier creek modification.

9. Exploration of functional earthforms necessary to separate distracting highway elements from the human experience.

Summary Recommendations

The history of modification for this reach of Los Gatos Creek represents a compromised ecological resource. Correspondingly, unfavorable environmental effects to the local community and County have resulted. The creek is an irreplacable natural resource contributing to the enrichment of the urban environment. This report has endeavored to illustrate alternatives for ecological and aesthetic enhancement of the creek and its immediate environment.

A. Los Gatos Creek is a potential link in a County and community open space corridor linking regional park facilities. It is a significant natural asset and should be sensitively developed to begin recapturing intrinsic values associated with unmodified natural water courses.

B. Recognizing the importance and influence of development adjacent to the creek, a comprehensive program of landscape enhancement and environmental integration should be initated. Existing conditions present a variety of situations which require evaluation and recommendations to improve the creek experience. Particular emphasis and attention should be given to landscape treatment and zoning requirements for future industrial developments bordering the creek.

C. The west percolation ponds, adjacent to Los Gatos Creek County Park, offer creative opportunities for water related activities. The optimum potential of this recreation resource should be realized by providing an environment attractive to a wide cross section of the community. Considerations for maximum usability and activity include ease of accessibility, and variety of space types and recreation facilities. The widespread demand and popularity of water resources within Santa Clara County is well evidenced by park and recreation statistics.

D. An important consideration for design proposals related to the creek must include references to the adjacent highway and vehicular traffic. The viewing experience from the highway should be one of the goals in developing landscape treatment for the creek. Continuing a mutually benefiting relationship, the Department of Transportation and the Santa Clara Valley Water District should endeavor to develop programs for highway and creek beautification. Working together with continuing communication and co-operation, these agencies may stimulate and provide alternatives for the visual enhancement of the community's image.

E. Essential to the validity and merit of this study is a continuing review of flood control projects relating to the Los Gatos Creek system. Engendered within this report is an optimistic spirit for generating planning interest and citizen involvement in developing the creek resource as an exciting linear open space and recreation asset. Local citizens can begin to influence planning goals and objectives affecting their environment by becoming aware of existing conditions and natural processes of the creek system.

F. An important consideration throughout this study has been the retention of the creek channel's hydraulic characteristics. These characteristics are recognized as essential to flood water containment and water transportion. The existing channel and related improvements represent a major economic investment. The level of protection afforded by their inherent design should be maintained according to the needs and desires of the community. The percolation pond areas have been engineered and designed for optimum water conservation and groundwater recharge. It is recommended that an assessment of groundwater recharge capacity be made prior to alteration of existing percolation facilities. Consideration should be given to use of currently owned Water District land as potential sites for construction of new facilities as needed to maintain existing groundwater recharge capacity. The six foot diameter Central Pipeline is the only source of imported water for the west side of Santa Clara Valley, and is currently the sole source of water for the Rinconada Water Treatment Plant. It is recommended that landscape improvements within the pipeline corridor be carefully evaluated and coordinated with necessary pipeline operational and maintenance requirements.

G. An expanded grounds maintenance program is a necessary responsibility accompanying new landscape developments; the initial three years of plant establishment are especially critical, and it is recommended that sufficient funds be allocated to the maintenance department in order to accommodate this critical period. Other maintenance factors such as vehicle access routes and increased organic debris should be accounted for to the greatest degree possible within the scope of new landscape developments. A new policing program should also be formulated and included as a necessary maintenance item.

H. Participation by scientific and educational groups should be continued as an aid for monitoring rehabilitation progress and evaluating project effectiveness.

Existing Conditions

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URBAN CONTEXT

This reach of the creek and the adjacent recharge pond area is very much influenced by four major existing elements or adjacent activities: Highway 17, adjacent industrial activities, existing park and recreation elements, and the Central Pipeline. Their impact greatly affects the creek environment.

The first major element, State Highway 17, is a heavily traveled major arterial which runs parallel to the creek. Horizontal distances from the east creek levee to the existing edge of the highway vary from a minimum of 70 feet to a maximum of 200 feet. The vertical roadway alignment from San Tomas Expressway north is accentuated by a rather steep side slope (generally 2:1) extending to lower elevations from the road shoulder to the highway right-of-way. This slope usually extends to the right-of-way fence before transition to the creek levee elevation. The freeway elevation generally tends to be above the top elevation of the creek levee, sometimes by a much as 15 feet. This elevation difference is very apparent when viewed from the levee top. The elevation and slope characteristics associated with the road have created a secondary "channel" between the creek and the highway. As a result, the highway and creek are visually integrated, occupying a common corridor.

Plant material has had little effect on the corridor. Although some tree planting has been accomplished within the area between the highway and the creek, its impact has been minimal. With the lack of physical and psychological separation between the highway activity and the immediate creek environment, the creek experience is dominated both visually and acoustically by noisy trucks, buses and automobiles.

The highway-creek relationship differs in the segment of creek south of San Tomas, tending to be generally flatter in cross section, although the distracting highway acoustical influence remains. At the extreme southeast portion of the study area, natural landforms and mature vegetation provide a separation between the highway and the pond area to the west; this type of separation might be further developed throughout the study area.

A second major environmental influence is the adjacent industrial activity bordering the west side of the creek. Extending along the creek channel and percolation pond right-of-way, these industrial complexes are prominently visible from the creek area and the freeway. Manufacturing and related industrial type activities are light and generally small in scale; they include machine engineering and assembling shops, warehousing and automobile repairing. Individually small in scope, the composite influence of these activities is nonetheless an encroachment on the immediate creek environment. Over the years industrial structures and associated materials have have encroached up to the creek's edge, and creek frontage in the industrial area is generally used for storage and utility space. A particularly prominent example is a concrete mixing facility between San Tomas and Campbell Avenues. This facility parks and stores trucks, trailers, automobiles and lumber materials haphazardly for approximately 1,000 feet along the creek.

Compounding this situation is a lack of vegetation and grade separation. Planting of screen trees has been noticably minimal. Cross sections through the creek levee to adjacent industrial properties generally tend to be flat and uninteresting. Consequently, the industrial influence distracts from a continuous creek image. A program for visual separation of these two incompatible elements remains to be realized.

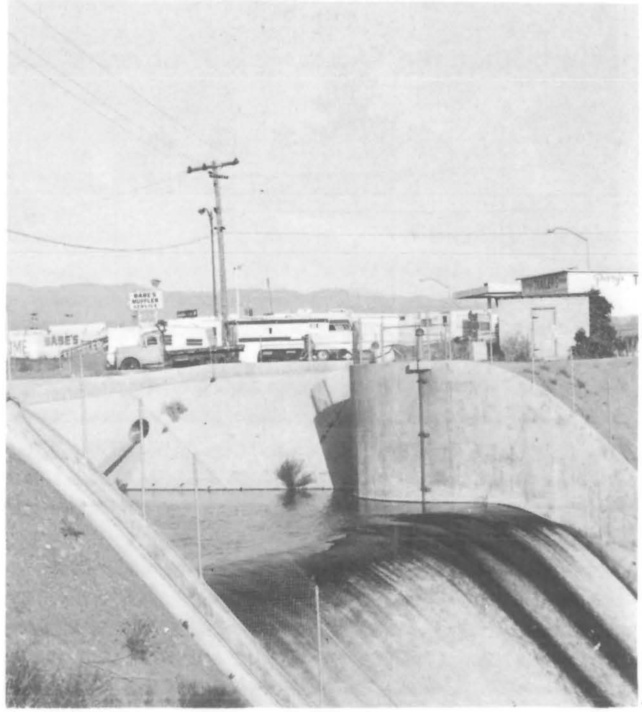
The existing adjacent park and recreation facilities occurring along this reach comprise the third major element affecting the creek environment. A small neighborhood facility, Campbell Park, is located near the north boundary of the study area adjacent to Campbell Avenue. Accessible from Campbell and Gilman Avenues, this park is maintained by the City of Campbell. It includes school-age and tot play areas, picnicking and sitting areas as well as restroom facilities. Activity and use of this facility is currently neighborhood oriented with limited vehicular parking provisions.

Los Gatos Creek County Park, a larger facility of 8.5 acres, is located about midpoint along this reach of the creek near San Tomas Expressway. Completed in 1968, this park is directly adjacent to the west percolation pond area. The west recharge ponds are potentially a valuable resource for recreation. Currently, the ponds are stocked with rainbow trout in the fall and winter months by the Department of Fish and Game, providing fishing excitement for young and old alike. In addition to fishing, park related activities include model boat sailing, waterfowl observation and feeding, picnicking, bicycling, sail boating, and hiking. The existing site development includes a small restroom facility and parking for approximately 100 automobiles. The park's relative remoteness and inaccessibility, however, combine to discourage extensive use and activity. Contributing to the underuse of this area is sparse vegetation, flat terrain, proximity of noisy highways and minimal grounds maintenance. In general, the existing park areas could be more usefully integrated with the nearby water areas.

THE CREEK ENVIRONMENT

The present condition of Los Gatos Creek is by no means unique for California waterways. Traditionally, Californians have ignored the potential flooding hazards associated with creekside development, yielding to urban land pressures by developing and encroaching upon natural floodplains. The reaction to real estate development on floodplains more often than not has been to reduce the threat of flood disruption by instigating a "Flood Control Program." Because of limited rights-of-ways, increased hard surface runoff, and rapid concentration of seasonal runoff, flood control improvements have tended to be single-purpose in function. Channels have often been engineered for statistical flood capacity accommodation calculated by storm flow rates. Designed for efficient water flow and rapid transport within a narrow space, channels are often rigidly geometric and reinforced with concrete lining.

This section of Los Gatos Creek, in its present state, may be analyzed as a reflection of flood control circumstances. The flood improvements begun in 1966 and recently completed, endeavored to restructure the existing creek's cross section to insure containment of the hundred year flood. Recent modifications involved deepening the creekbed by 5 to 10 feet, levee realignment and construction, maintenance access road construction, and three major concrete drop structure constructions. Hydraulically the drop structures have been engineered to slow water flow velocities and minimize earth bank erosion.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The vertical fall at each drop structure ranges from 6 feet to 29 feet. The creek channel bottom slopes at the rate of 6 inches per 100 feet from an elevation of 239 feet above sea level at Kirk Dam to about 162 feet above sea level near the Campbell Avenue crossing. The creek channel sides are constructed from compacted earth fill and mostly graded to geometric slopes. Noteworthy among the drop structure improvements was the construction associated with the diversion of water to percolation ponds adjacent to the creek. This work involved installation of new transmission pipes and channels required for maximum water conservation and efficiency of operation.

The existing total percolation pond areas east and west of the creek occupy about 55 acres of land. Judged on merits as a flood control project, these modifications maybe considered a substantial success and benefit to the local Campbell community. This single function and purpose, however, is aesthetically and ecologically undesirable; the environmental effects need to be re-evaluated.

The creek itself, before the 1850's a meandering and vegetated water course, has been transformed into a man-made water course possessing few characteristics associated with nature. Grading and earth construction related to channel alignment and levee installation have stripped the area of meaningful vegetation. Severe and rigid creek banks, graded at 2:1 or 1-1/2:1 slopes and hinging at the top of the levee, are in striking contrast to the more soft and irregular lines generally associated with natural terrain. This cross section of the creek continues unvaried for 2.5 miles. Strong linearity and sparse vegetation are major elements contributing to negative creek impact; in essence, this portion of the creek bears slight resemblence to a "real" creek. The opportunity for a dynamic and diverse resource constrasting with urban surroundings remains to be developed.

VEGETATION

The vegetation aspects of the existing creek may be described as a reflection of historical disruption. Substantial tree stands or vegetated slopes are non-existent. The only significant tree specimens directly related to the creek are two very large California sycamores; one tree is located near San Tomas Expressway, and the other tree near Kirk Dam. These mature trees remain as vestiges of valley riparian vegetation. The typical ground cover on creek slopes, for the entire study distance, can be described as native California scrub grasses. This grass cover adapts well to disturbed sites, and responds to seasonal conditions, browning in the warm and dry summer months. The continuous texture of the grass is rarely relieved by wildflowers or perennials..

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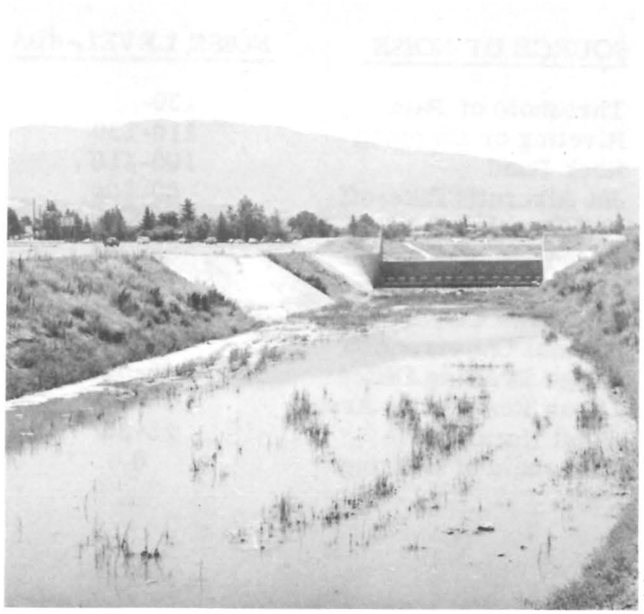
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The creek bottom is somewhat sporadic in appearance, although portions of the creek display prominent areas of aquatic grasses as natural systems continue to function despite man's disruption. Visually, the grasses relieve the vast scale of the channel by creating subchannels that meander from side to side. This aquatic plant life provides valuable waterfowl shelter and cover.

Significant vegetation bordering the creek is difficult to categorize. Strong plant groupings are virtually non-existent in the study area. A visual inventory of existing species includes Sequoia sempervirens, Pinus radiata, Eucalyptus species, Schinus molle, and Platanus racemosa. Significant groupings of Sequoia have been planted on the opposite side of the freeway. Eucalyptus plantings occasionally abut the west side of the creek with a significant stand occurring near the Campbell crossing. Along the freeway right-of-way planting is minimal. Some planting of Pine and Sycamore has been accomplished, but they suffer from lack of irrigation and maintenance. Noteworthy, however, is the landscape planting recently completed in the San Tomas overpass vicinity. Here, the right-of-way has been planted in Pine and Sycamore with ivy as a ground cover. The plant grouping is well maintained and when mature will become a major visual element within this area of the creek.

ACOUSTICS

The existing noise level generated by Highway 17 vehicular traffic is an important element of the Los Gatos Creek environment. Traffic noise orginates from exhaust pipes of motor vehicles, fast moving tires on the pavement, shifting of gears, and occasional horn blasts. Generally, the noise levels are greatest close to the freeway, and decline as the distance from the freeway increases.

Noise levels are commonly expressed in decibels. Acoustical studies relating noise impact on people commonly employ a frequency-weighted noise measure which approximates how we hear. This measure is termed the "A-Scale", and is usually indicated in decibels A or dBA. The following chart illustrates the dBA values for a number of familiar situations.

LEVEL OF COMMON NOISE SOURCES

SOURCE OF NOISE	NOISE LEVEL-dBA
Threshold of Pain	130-
Riveting or Chipping	110-120
Rock Band	100-110
Jet Aircraft/Take-off (1/2 mile)	90-100
Large, Noisy Machine Shop	80-90
Alongside a Busy Freeway	70-75
Downtown City Street	65-70
Normal Conversation	60-70
Large Drafting Office	45-55
Urban Residential Area	35-45
Quiet Rural Scene	25-35
Threshold of Hearing	0

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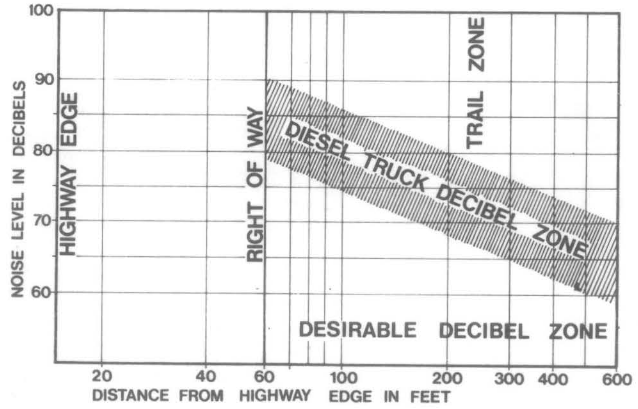
Diesel Truck Peak Noise Range



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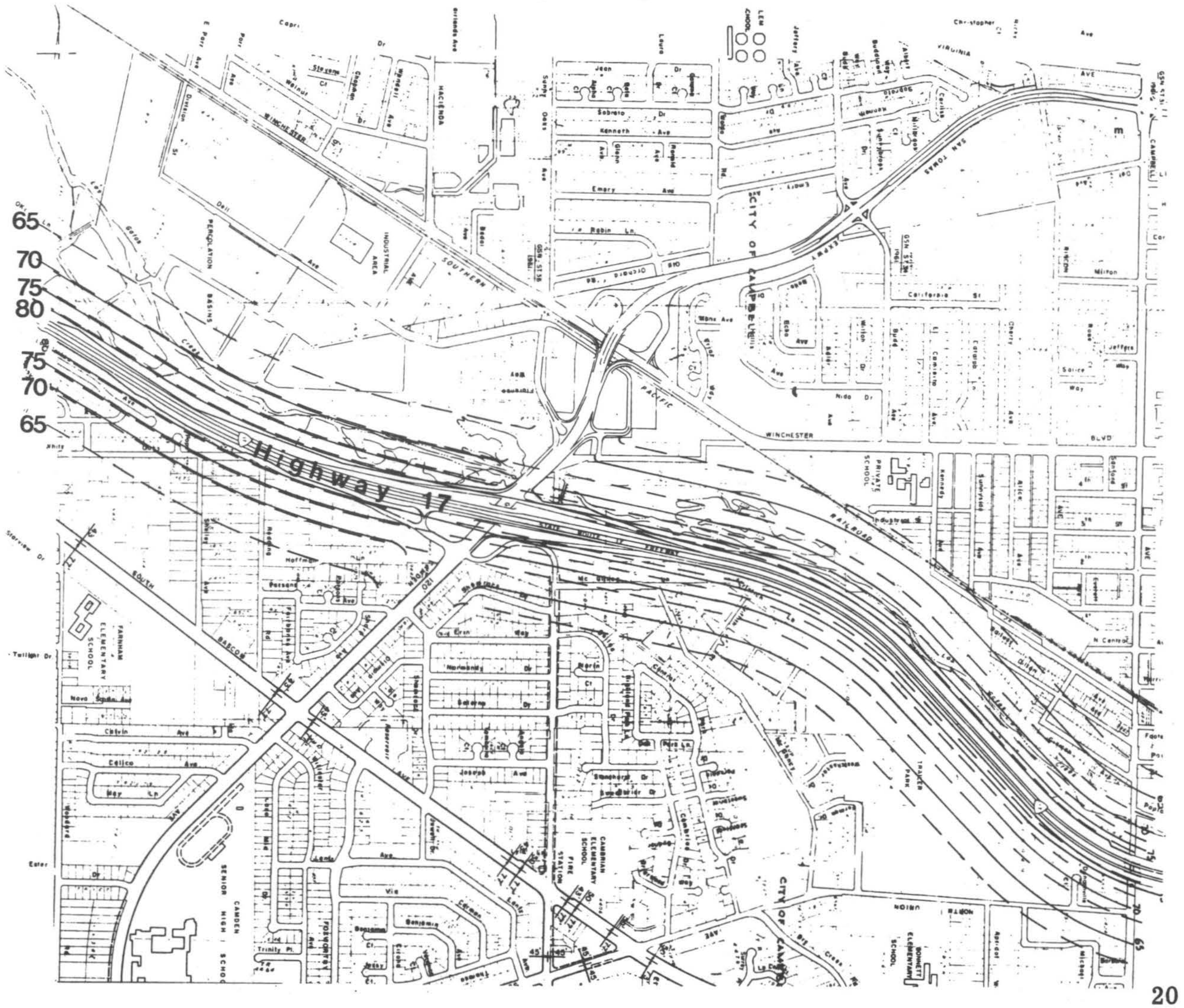
Noise Contour Map of Highway 17



The existing average noise levels adjacent to Highway 17 have been documented by the Department of Transportation Environmental Division (see Noise Contour Map, Page 18). Peak noise levels at the right-of-way line are mostly generated by fast-moving diesel trucks, and range from 78-85 dBA. Radiating across the landscape, these levels may be anticipated to diminish according to the graph on Page 12. Generally, the 70 dBA level represents the maximum degree of sound exposure desirable for outdoor activities and recreational enjoyment. The noise level at the west creek levee and trail location fluctuates near this 70 dBA level. Alternative measures were studied to explore landscape modification as a means to diminish this average noise level. These measures are intended to effectively improve the acoustical aspect of the creek environment.

Visual Form and Program

As a preliminary step in the Master Plan formulation for Los Gatos Creek, a visual form and program plan was prepared to show zones of activity and to identify important visual relationships. This plan is presented diagrammatically, and is intended to convey general aspects of the creek environment and respond to specific engineering constraints. The plan recognizes the influence of surrounding land uses and makes recommendations for future development and open space acquisition.

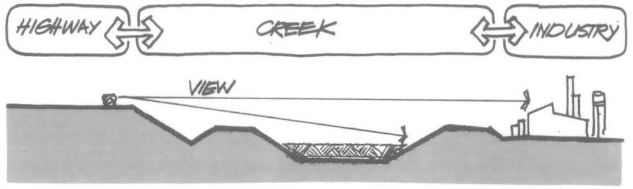
CORRIDOR DEFINITION

In the program development of Los Gatos Creek, corridor definitions or zone of influence became an important consideration. Following discussion with local citizens, it was determined that the existing corridor situation could be drammatically improved. Accordingly, the program defines elements affecting the present corridor and makes recommendations for modifications.

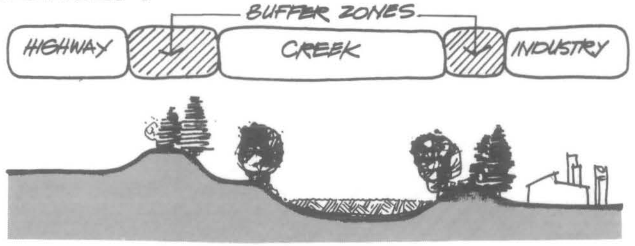
The existing creek corridor is dominated by two significant elements: 1) an urban freeway of massive scale and, 2) encroaching industrial development. These combined elements substantially reduce the quality of the creek's environment, and the human experience is diminished when people are placed in relationship to the overwhelming scale and character of the landscape as it exists today.

The purpose of the proposed landscape development is to visually and psychologically separate the existing incompatible land uses, thereby enhancing the overall image and character of the creek. Visual and acoustical screening by mounding and planting is proposed to alleviate the highway's impact and define the linear creek corridor. Contiguous tree planting will lessen the overwhelming scale of the existing corridor for the motorist and the hiker. The intent is to provide a more human-scale environment by introducing landscape treatment as a bold statement to the creek's presence.

EXISTING



CONCEPT



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USE ZONES

In designating use zones or potential areas of activities, the plan endeavors to provide for a wide variety of uses and experiences logically oriented to the inherent characteristics of the site. Thus, the west recharge ponds, readily accessible to the County Park, are proposed as an important node along the creek corridor. Sensitively developed to human scale, this area may be enjoyed by individuals and groups involved in varied leisure activities. Moving from north to south, it is proposed that each pond become more intimate or secluded in feeling. A diminishing degree of activity or human intrusion is to be encouraged for each successive pond area. The opportunities for multiple use of these facilities in general may include fishing, model boating, canoeing and other non-powered boating, hiking, and picnicking.

The recharge ponds located east of the creek, by contrast, are relatively inaccessible to large numbers of creek visitors. These ponds are smaller in size and limited in multiple use aspects. It is proposed that development of these ponds should be designed to attract and re-establish some of the wildlife associated with aquatic habits in this region. This wildlife refuge might provide a variety of habitats designed for re-establishment of displaced species. It has the potential of becoming a unique and significant resource for bird observation and study. Also, the widened area between the highway and the creek near San Tomas Expressway, is to be developed as an isolated bird refuge. The plan proposes major earth mounding and dense landscape planting to screen the freeway from the creek area.

Similar to the recharge pond areas, the existing creek-related land near Campbell Avenue offers exciting park and open space potentials. It is proposed that the existing Campbell Park be expanded. The areas under consideration for future park expansion are located on each side of the creek, and to the north of Campbell Avenue. West of the creek, the park may be enlarged to include additional acreage, and it is recommended that this area be further related to the creek by constructing a water-oriented trail with picnicking provisions nearby.

The area on the east side of the creek may be eventually developed to include more active recreation benefits. Presently, a small commercial establishment and two residences occupy a portion of this site. Future recreation development might include a climbing mountain, creative play spaces, and large scale open play areas.

As a further aspect of open space development for this locale, the plan recommends that the land east of the creek and north of Campbell Avenue be incorporated in future park planning. This additional site might accommodate limited parking facilities serving the combined areas. To facilitate creek trail continuity, this area should be linked to the spaces south of Campbell via a trail separated from vehicular traffic.

Besides these specific use zones, the Master Plan recognizes three major constraint zones along the creek: 1) hydraulic constraints as identified by Santa Clara Valley Water District officials, 2) existing roadway constraints - San Tomas Expressway and Highway 17, and 3) existing utility constraints - the 66 inch diameter high pressure waterline located along the Highway 17 right-of-way. These constraints mainly relate to future planting and earth mounding operations at specific locations along the creek.

CIRCULATION

The circulation aspects of the plan development have been important considerations throughout the Los Gatos Creek study. The creekside environment offers a unique opportunity to develop a path system within the City which is completely separated and/or disassociated from fast moving vehicular traffic. These paths may be used as connectors to existing destination points along the creek, and eventually as major routes to the Bay and the Santa Cruz Mountains. The program for pedestrian and vehicular circulation was formalized with the above considerations in mind. This program identifies three major levels of circulation: 1) maintenance vehicles only, 2) pedestrian, bicycle and maintenance vehicle common use, and 3) pedestrian only.

The first level of circulation is to accommodate maintenance vehicles and is now in existence on each side of the creek. It is proposed that the path on the east side, adjacent to the freeway, be primarily maintained as a service access for District maintenance vehicles. Pedestrian and bicycle use on this side of the creek should be discouraged. Difficult access and lack of path continuity as well as proximity to the freeway make this area less desirable for hiking and bicycling experiences.

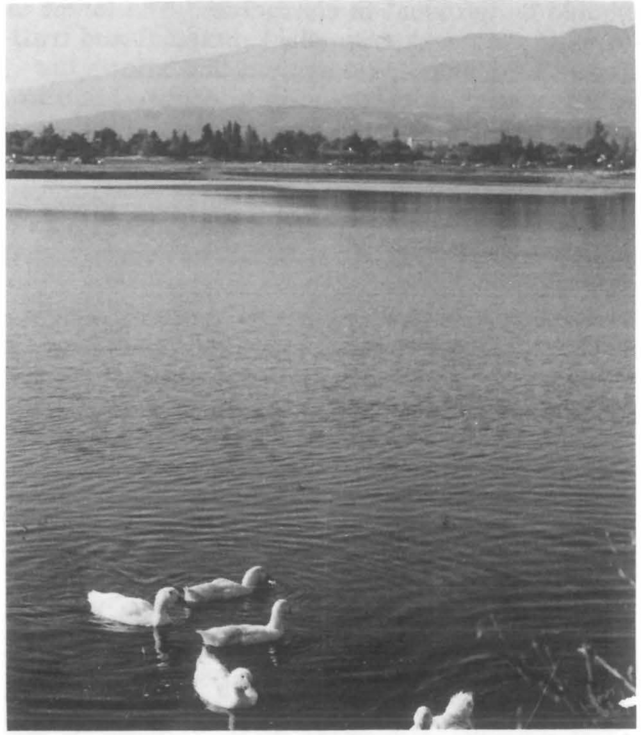
The path on the west side of the creek, on the other hand, offers diverse opportunities for joint utilization. Points of access are numerous and desirable for trail continuity. It is intended that this path accommodate maintenance vehicles, hikers, and cyclists. The path may be designed with several surface types. Thus, a portion of the existing path may be hard surface (minimum 10 foot width) to accommodate pedestrians and bicyclists.

The additional remaining area would be maintained as a soft surface. Maintenance vehicular access and usability would remain unobstructed at 15 feet overall width.

The third level of circulation is a path and trail system for hiking. Single purpose in function, this system is intended to provide a variety of experiences related to the water's edge, and should be informal in character. The intent is to use land reshaping, plant material and trail layout in developing a system that allows the hiker maximum opportunity to choose his own hiking route within the project area. These trails would be related to the west creek edge and to the perimeter of the west ponds.

Master Plan

The Master Plan for this reach of Los Gatos Creek has two general functions. As a planning guide, it serves as a point of reference for future improvements along Los Gatos Creek, and for similar water course resources within the Santa Clara Valley region. As a development guide, the Master Plan incorporates plans for pedestrian and vehicle circulation, landscape planting, and earth mounding and reshaping.



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GRADING ASPECTS

Earth grading has been proposed to:

1. Define the Highway 17 corridor, and improve the driver's visual experience.

2. Diminish the impact of the adjacent freeway on the creek corridor.

3. Introduce visual diversity and interest along the creek, and relieve the channel geometry.

4. Introduce visual diversity and interest in the percolation pond area.

5. Encourage and attract wildlife associated with natural water habitats in this area.

North of San Tomas Expressway, major earthwork is proposed in the area between the highway and the creek channel. Earth mounds are recommended to visually and acoustically screen highway activities. Acoustical research data shows that earth mounds with planting absorb some sound. A mound 11 feet above the highway surface has been defined as an effective noise reducer. Constructed to this height, a mound will reduce diesel truck noise by 10 to 15 decibels. Existing site width and utility constraints limit the maximum mound height to less than 11 feet in the project area between Highway 17 and Los Gatos Creek. It is anticipated that mounding in this area will reduce noise levels by 5 to 10 decibels. An indirect sound screening factor is the psychological impact resulting from visual separation of the hearer from the noise source.

The Environmental Section of the Department of Transportation has prepared a noise contour map for this section of the freeway. It is recommended that acoustical information be recorded before and after mound construction in order to assess the measurable effect of sound screening. Such documentation would be a valuable addition to knowledge of sound mitigation along suburban freeways.

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Because of the limited space between the freeway and the creek levee, the mounding proposed will encroach upon the highway right-of-way. Discussion with the Department of Transportation with respect to this has been most encouraging, and the Department wishes to co-operate fully. Necessary detailed construction plans will need to be reviewed and proper permits issued.

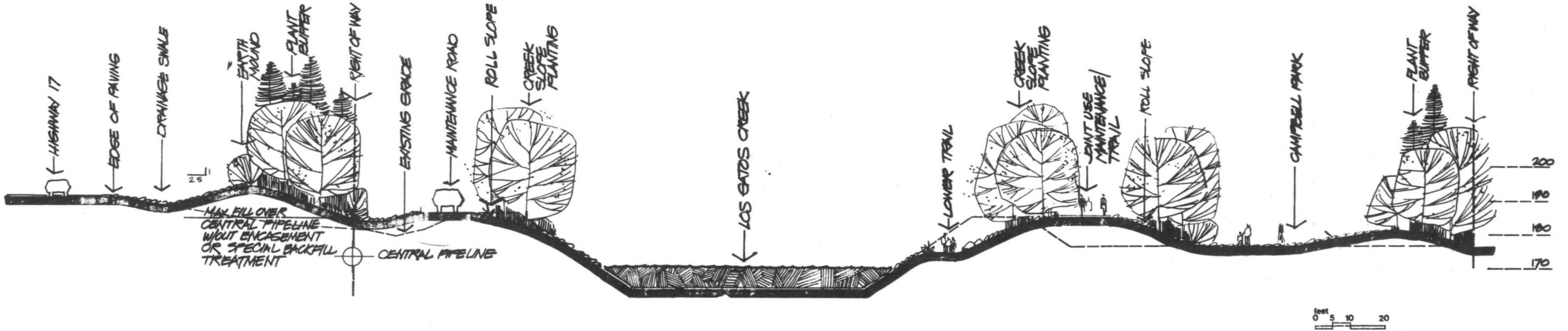
Evaluation of existing cross sections shows that earth mounding and reshaping will involve substantial imported soil. Mound heights in the area between Highway 17 and Los Gatos Creek vary between 4 feet and 6 feet in relation to the elevation of the Highway. To facilitate existing drainage patterns, a distance of 15 feet is to be maintained from Highway 17 paving edge to the toe of proposed mounds. To avoid potential erosion problems, new slopes should not exceed 1 foot vertical per 2.5 feet horizontal distance. Contours should be irregular and variable in form. Earth mounds should be located to avoid new fill near existing manholes, and should conform to the allowable 15 foot maximum fill over the Central Pipeline as established by Santa Clara Valley Water District's engineers.

The amount of fill required to accomplish the proposed mounding in the area north of San Tomas Express is estimated to be 130,000 cubic yards. Because of the magnitude of the proposed operation, it is recommended that the site be made available to local construction contractors as an earth fill disposal site, and that project construction be coordinated with available earth fill.

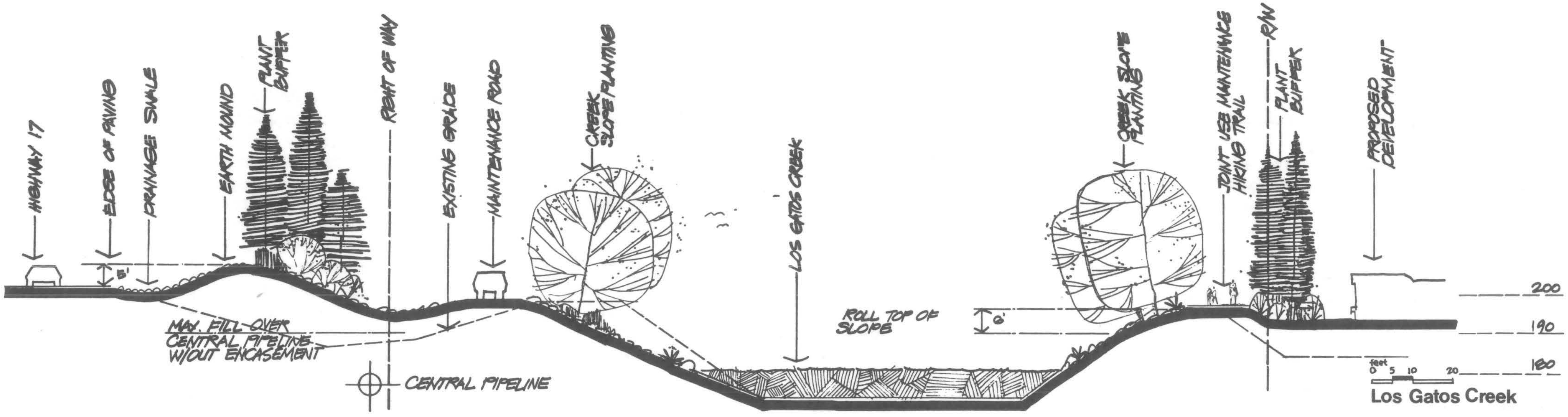
Earth mounding is also proposed between Highway 17 and the east levee in the creek area south of San Tomas Expressway. In contrast to the north area, mounding operations in the south area will be less extensive, and proposed cuts and fills will be approximately balanced. Fill required to develop mounding will be generated by excavating two nearby percolation ponds on the east side of the creek. Pond No. 2 is to be excavated about 12 feet overall, and Pond No. 1 is to be partially excavated by as much as 10 feet. It is estimated that 25,000 cubic yards of soil will be moved to develop proposed mounding and reshaping in this area. It is recommended that primary construction occur in the area between the proposed bird habitat and the freeway on-ramp.

Earth mounding and reshaping in the wildlife area is to be developed to assist in restoring ecological variety and balance. Developments are to include softened pond configurations, varied water depths, special tule and stream habitats, and an isolated and protected bird nesting island. Special acknowledgement is given to the Audubon Society Advisory Committee for development of the wildlife area concept (see Appendix A-1 for ecological data researched by the Committee).

The Master Plan recommends earth mounding and reshaping at the ponds located west of the creek in order to develop more natural pond configurations. Earthwork should relate to pond edges and should respond to established and proposed uses. A level beach and sun area is proposed at one location on the north edge of Pond No. 1. In general, flattened pond sides



SECTION a-a of MASTER PLAN MAP
station 7+50



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SECTION **b-b** of MASTER PLAN MAP
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are not desirable because of groundwater recharge considerations. As an alternative for minimizing flattened slopes, a boardwalk and dock system should be developed for small boat launching.

In Pond No. 2, a similar facility should be developed exclusively for model boating use. The design of these facilities should accommodate a water level fluctuation of 2 feet to 3 feet resulting from use of the ponds for temporary holding of imported water. Because of the basic function of the percolation ponds as a groundwater recharge system, it is recommended that alternative facilities be developed to compensate for recharge capacity lost through new development.

The Master Plan also recommends reshaping the creek side slopes where such modification is compatible with existing technological constraints. In the vicinity north of San Tomas Expressway, the plan proposes major channel alignment adjustment in four specific locations. In each location, the channel centerline would be adjusted up to a maximum of 25 feet from the existing centerline, with the adjustment occuring over a longitudinal distance of 600 feet. This will allow for a reduction in steepness on the west slope of the creek and facilitate trail accessibility to the water's edge.

The plan also recommends channel regrading in the area south of San Tomas Expressway and adjacent to the percolation ponds. For this area, in order to maintain desirable flow characteristics, creek side slopes are symmetrically reduced in steepness. This modification is proposed in locations over a longitudinal distance of 600 feet. To preserve the structural integrity of the adjacent ponds, the existing levee width will be maintained.

The top of the creek banks may be visually softened by rounding off the top 6 feet of the slope; as a visual result, the levee top will shift slightly away from the creek. Irregularity of occurrence is desirable for this type of treatment. The intent is to diminish or relieve the severity of consistent side slopes.

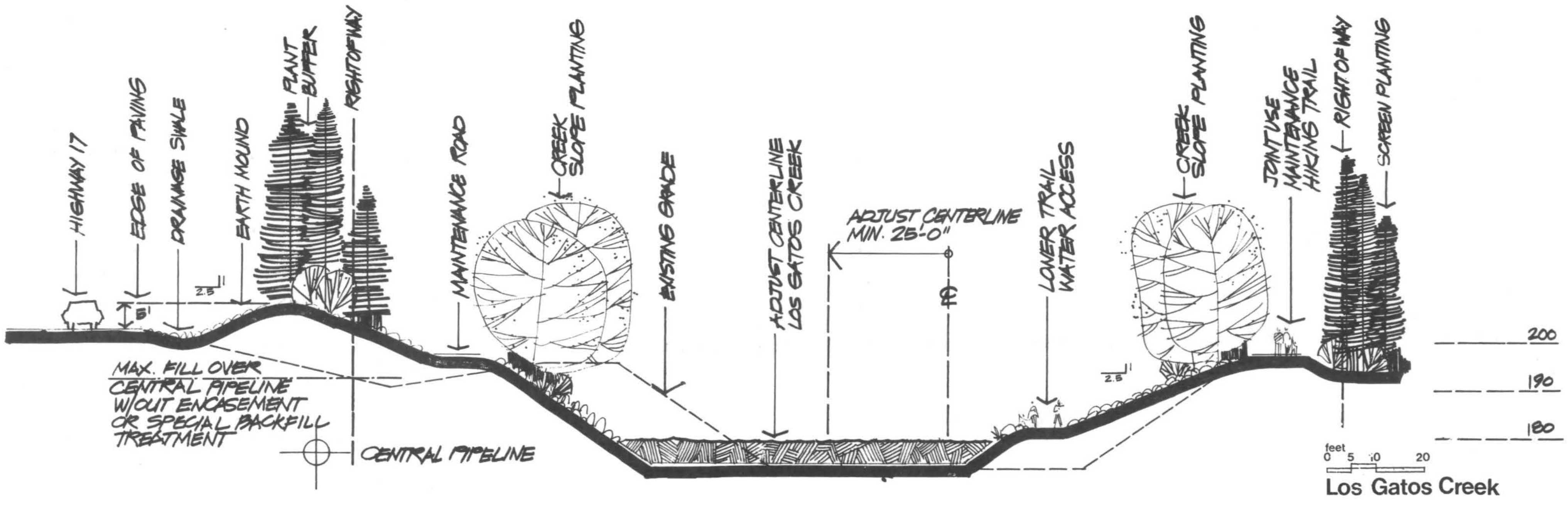
PLANTING CONCEPT

The Master Plan recommends major landscape planting. Tree establishment within the Los Gatos Creek corridor should be considered an essential project element. Tree color, form, size, texture and seasonal variation create contrast and diversity in the landscape. A large scale planting program will help to re-establish this portion of Los Gatos Creek as an asset to the local community and to the Santa Clara County region as a whole.

The Master Plan visualizes the creek as a heavily vegetated, linear recreation corridor. The resulting impact of the new planting will be substantial, and the plan proposes to visually integrate new planting with the existing community landscape by responding to established plant types and groupings.

Criteria for Master Plan planting is largely based upon community desire and plant function within the project. The local community has expressed a strong desire that introduced plant material along the creek reflect natural conditions. Accordingly, the Master Plan incorporates a variety of native plant material associated with the Santa Clara County region. Environmental and horticultural plant material characteristics have been evaluated to determine the species most desirable for specific areas within the creek corridor.

Functionally, plant material characteristics have been evaluated to determine the species most desirable for specific use situations. As the plan developed, visual screening became an important functional consideration. Screen plants were selected on the basis of rate of growth, dependability, form, foliage density, foliage color, and mature size. Evergreen species were evaluated as more desirable than deciduous species for visual and acoustical screening consistency. Erosion control was a consideration for slope areas, with special attention given to creek channel side slopes. Maintenance vehicle access was established as a criteria for plant material spacing at specific locations within the project.



SECTION C-C of MASTER PLAN MAP
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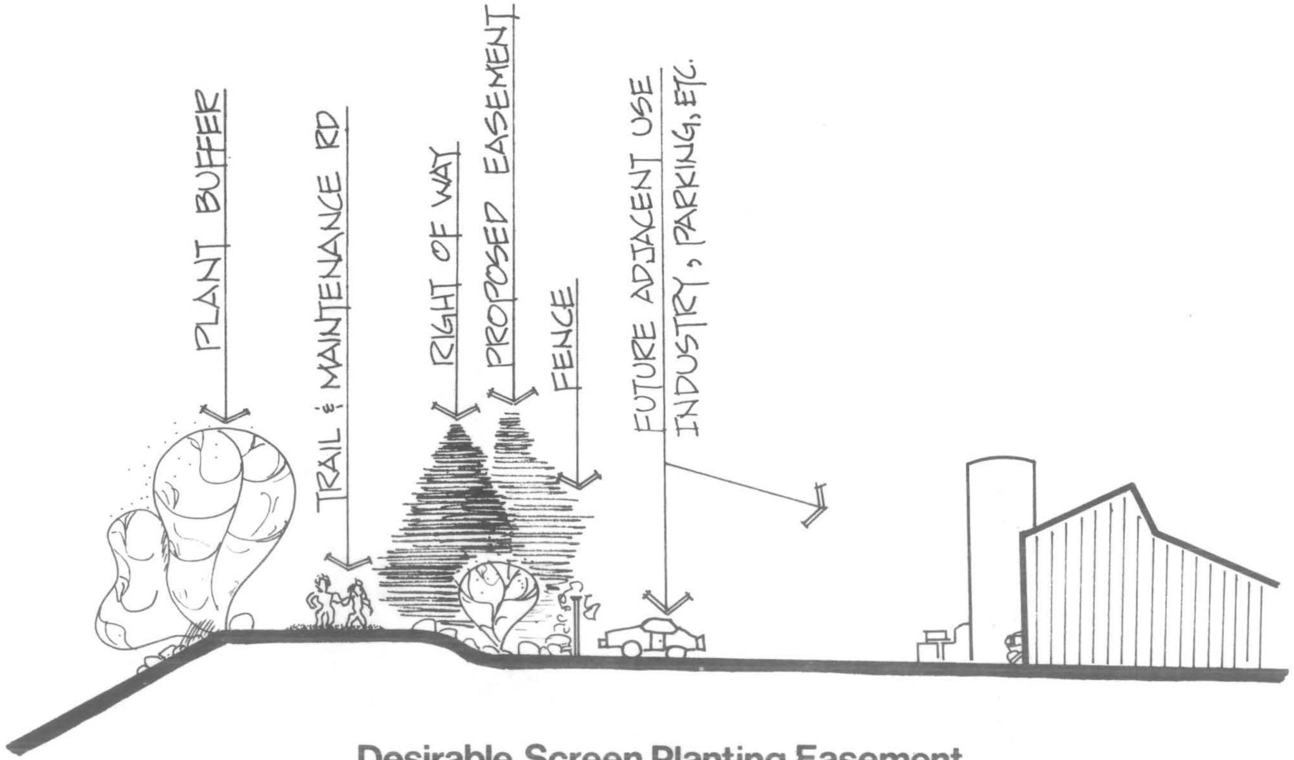
Landscape planting over the Central Pipeline is in conflict with possible future pipe repair and maintenance. Recognizing this, it is recommended that plant material within the pipeline corridor be of a type that is adaptable to soil disturbance and rapid in growth. The Water District should commit itself to re-establishment of landscaping disturbed by pipeline repairs.

The plan also recommends establishment of specific planting criteria for future development adjacent to this portion of the creek. Special planning ordinances should be instituted to insure:

1. Establishment of a landscape easement (minimum 10 foot width) adjacent to the channel right-of-way.

2. Compliance with the planting recommended by the Master Plan.

Adjacent property owners should be encouraged to undertake landscape projects that relate to Los Gatos Creek improvements.



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Desirable Screen Planting Easement

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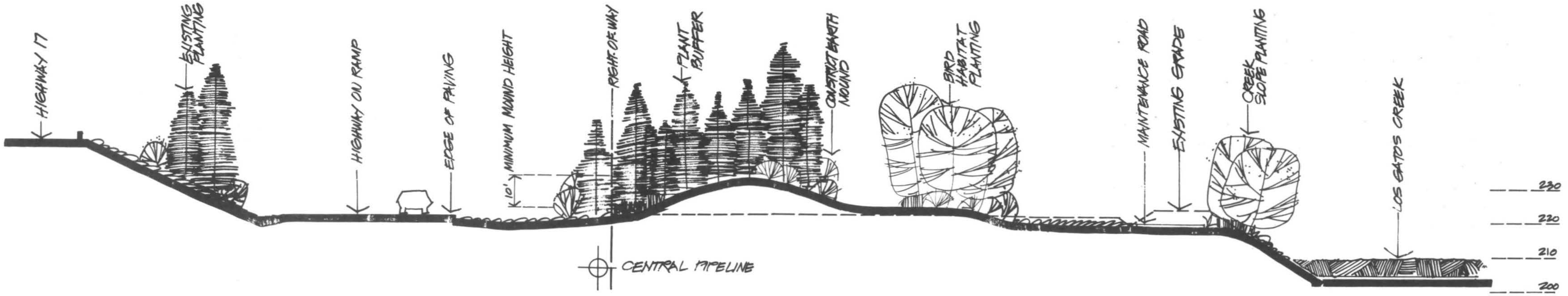
Plant arrangement and spacing is important. It is the intent of the Master Plan that plant groupings and spacings vary in a natural manner, and within the plant material framework, randomness is desirable. Strict and evenly spaced plant groupings should be avoided.

Continued community involvement is desirable for all phases of landscaping; scout groups, community organizations and all other community citizens are encouraged to actively participate. Further information can be obtained by contacting the Santa Clara Valley Water District's main office.

Special acknowledgement is given to the Santa Clara Valley Audobon Society Los Gatos Creek Committee for their willing research and preparation of plant material and other ecological data related to re-establishment of bird and wildlife in the Los Gatos Creek area. See the Appendix for a compilation of their research.



SECTION **d-d** of MASTER PLAN MAP
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Los Gatos Creek

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TRAIL CONCEPTS

The Master Plan recommends provisions for hiking, bicycling and trails. The proposed trails are intended to complement existing community circulation systems, as well as to develop new trail variety.

A primary circulation trail is proposed along the west creek levee to connect Campbell Park and Los Gatos Creek County Park. This trail may be jointly used for hiking and bicycling. The plan proposes that 10 feet of the main levee be hard surfaced with asphalt. This will allow for two-way bicycle traffic, and will help to minimize pedestrian conflict by allowing space for foot traffic at the side of the bike trail. Maintenance vehicle access will be unaffected by keeping an overall clearance width of 15 feet.

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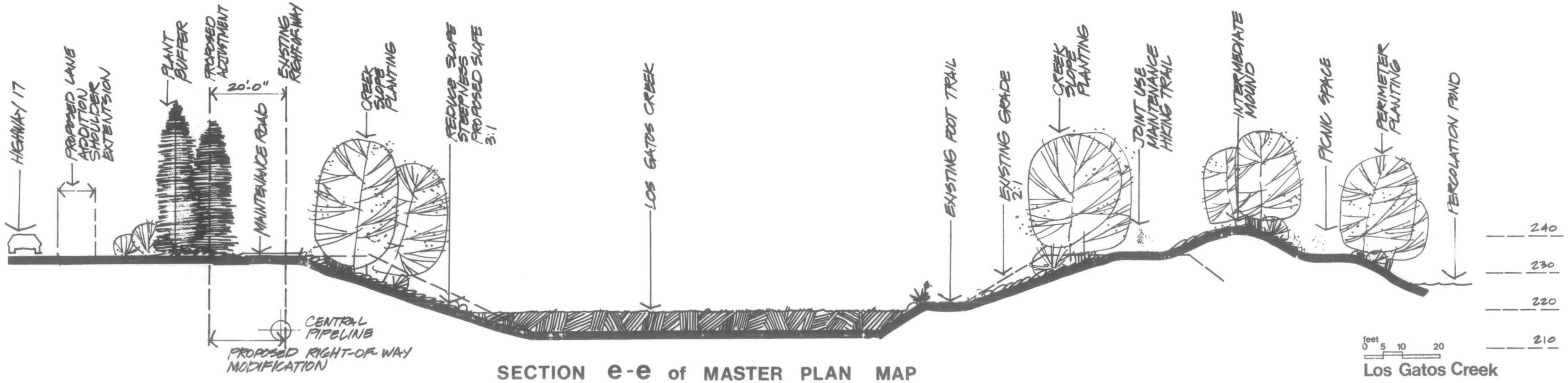
Decomposed granite surface is recommended for trails on levee areas between ponds, with maintenance vehicle access width being maintained where necessary. Strict geometric paving relationships should be avoided, and the paving width should vary slightly to relieve its inherent linearity.

Continuity of the path system is desirable within the project area and in relationship to junctions with existing community path systems. As an integral element of proposed Campbell Park development, a trail should link the parcels north and south of Campbell Avenue. The footbridge in the vicinity of Campbell Avenue is proposed to accommodate pedestrians and bicyclists. The bridge should be a minimum of

12 feet wide and might be designed as a suspension structure. This bridge will provide desirable access to the east creek bank and develop logical trail continuity to points north.

In the area immediately north of Kirk Dam, provisions should be made for continuation of the trail to points upstream as far as Lexington Reservoir. Procedures should be initiated to acquire sufficient right-of-way area for trail installation.

Pedestrian traffic is to be encouraged exclusively in certain areas. These paths are to allow leisure exploration of the water's edge in isolation from other types of traffic. Normally, foot paths will be defined by their intensity of use, and no special surface treatment is recommended. It is desirable to maintain a primitive character. The Master Plan proposes that this type of path be developed at specific points along the creek and at the perimeters of the west recharge ponds.



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Visual Form and Program

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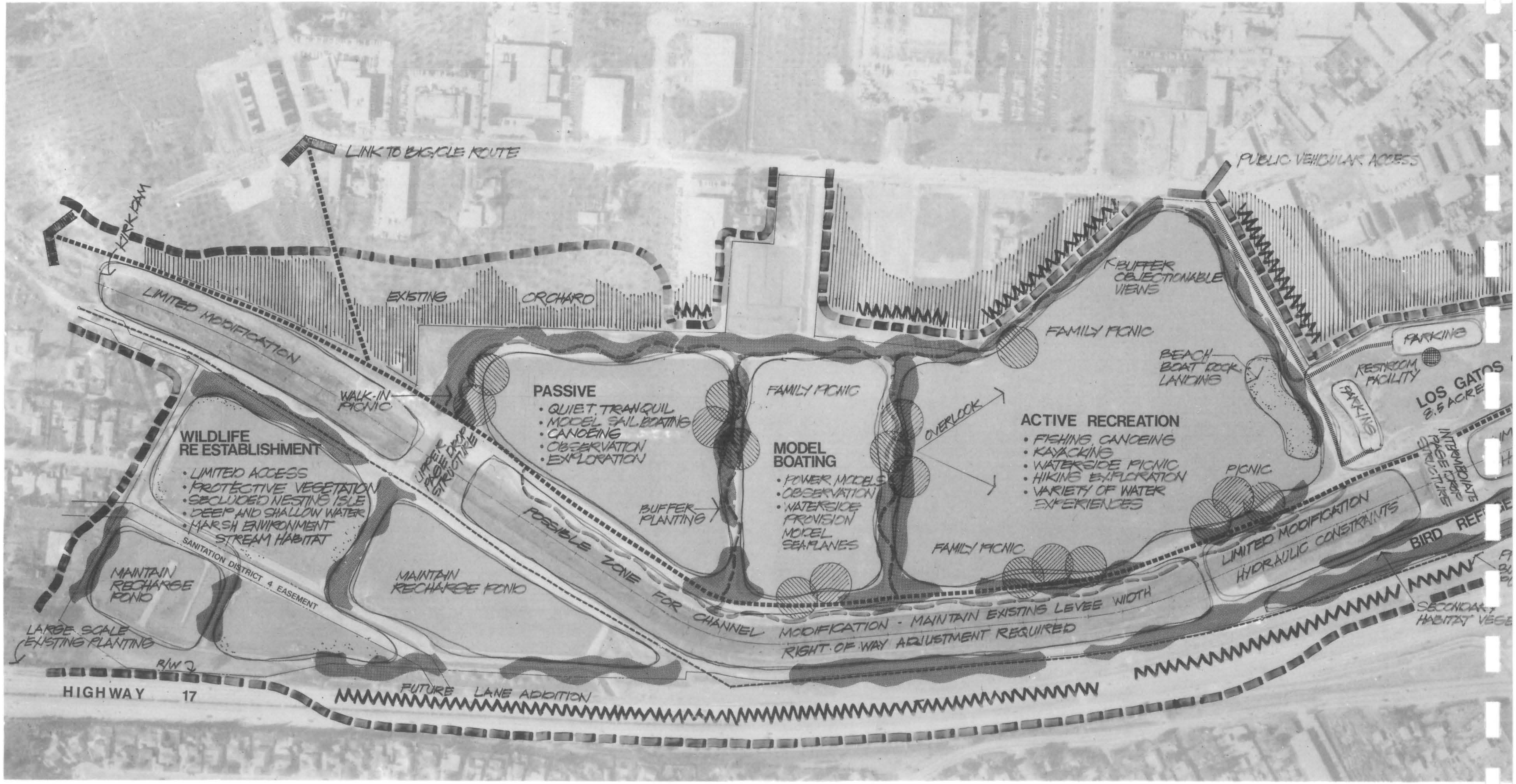
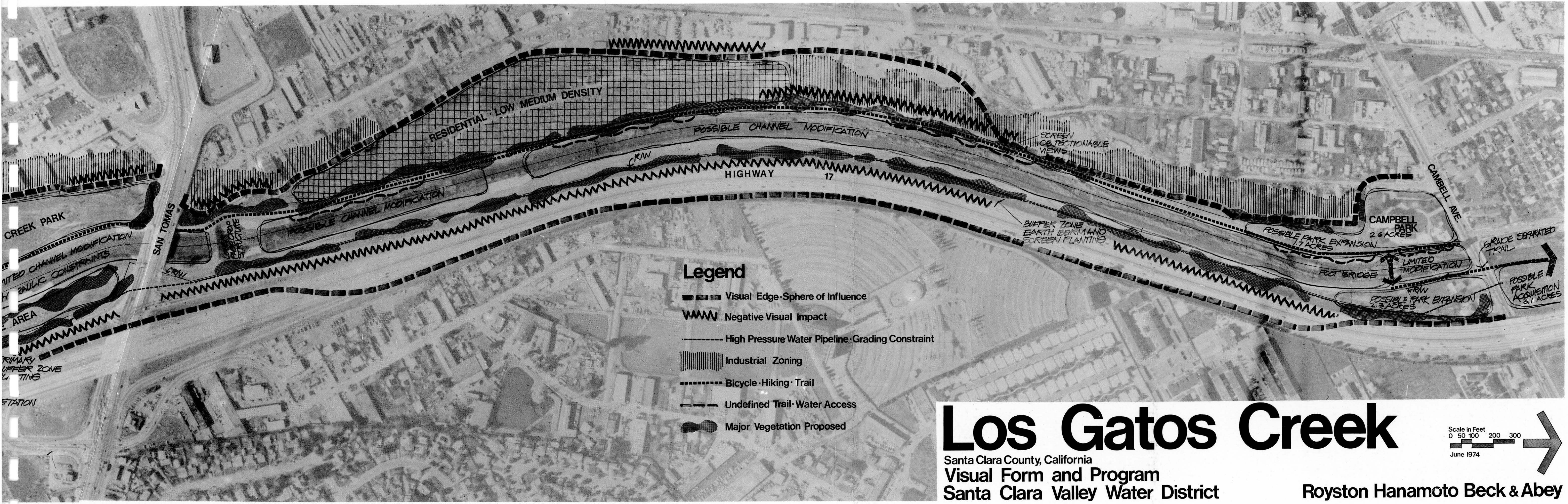

LINK TO BICYCLE ROUTE
KIRK DAM
PUBLIC VEHICULAR ACCESS
BUFFER OBJECTIONABLE VIEWS
LIMITED MODIFICATION
EXISTING ORCHARD
FAMILY PICNIC
BEACH BOAT DOCK LANDING
PARKING
RESTROOM FACILITY
PARKING
LOS GATOS
8.5 ACRE
WALK-IN PICNIC
PASSIVE
• QUIET, TRANQUIL
• MODEL SAILBOATING
• CANOEING
• OBSERVATION
• EXPLORATION
FAMILY PICNIC
OVERLOOK
ACTIVE RECREATION
• FISHING, CANOEING
• KAYACKING
• WATERSIDE PICNIC
• HIKING EXPLORATION
• VARIETY OF WATER EXPERIENCES
PICNIC
INTERMEDIATE PAGE DROP STRUCTURE
WILDLIFE RE ESTABLISHMENT
• LIMITED ACCESS
• PROTECTIVE VEGETATION
• SECLUDED NESTING ISLE
• DEEP AND SHALLOW WATER
• MARSH ENVIRONMENT
STREAM HABITAT
UPPER PAGE DROP STRUCTURE
MODEL BOATING
• POWER MODELS
• OBSERVATION
• WATERSIDE PROVISION
MODEL SEAPLANES
BUFFER PLANTING
FAMILY PICNIC
LIMITED MODIFICATION
HYDRAULIC CONSTRAINTS
BIRD REF
POSSIBLE ZONE FOR CHANNEL MODIFICATION - MAINTAIN EXISTING LEVEE WIDTH
RIGHT OF WAY ADJUSTMENT REQUIRED
SANITATION DISTRICT 4 EASEMENT
MAINTAIN RECHARGE POND
MAINTAIN RECHARGE POND
SECONDARY HABITAT VEGE
LARGE SCALE EXISTING PLANTING
R/W
HIGHWAY 17
FUTURE LANE ADDITION



Los Gatos Creek

Santa Clara County, California

Visual Form and Program
Santa Clara Valley Water District

Royston Hanamoto Beck & Abey

Master Plan

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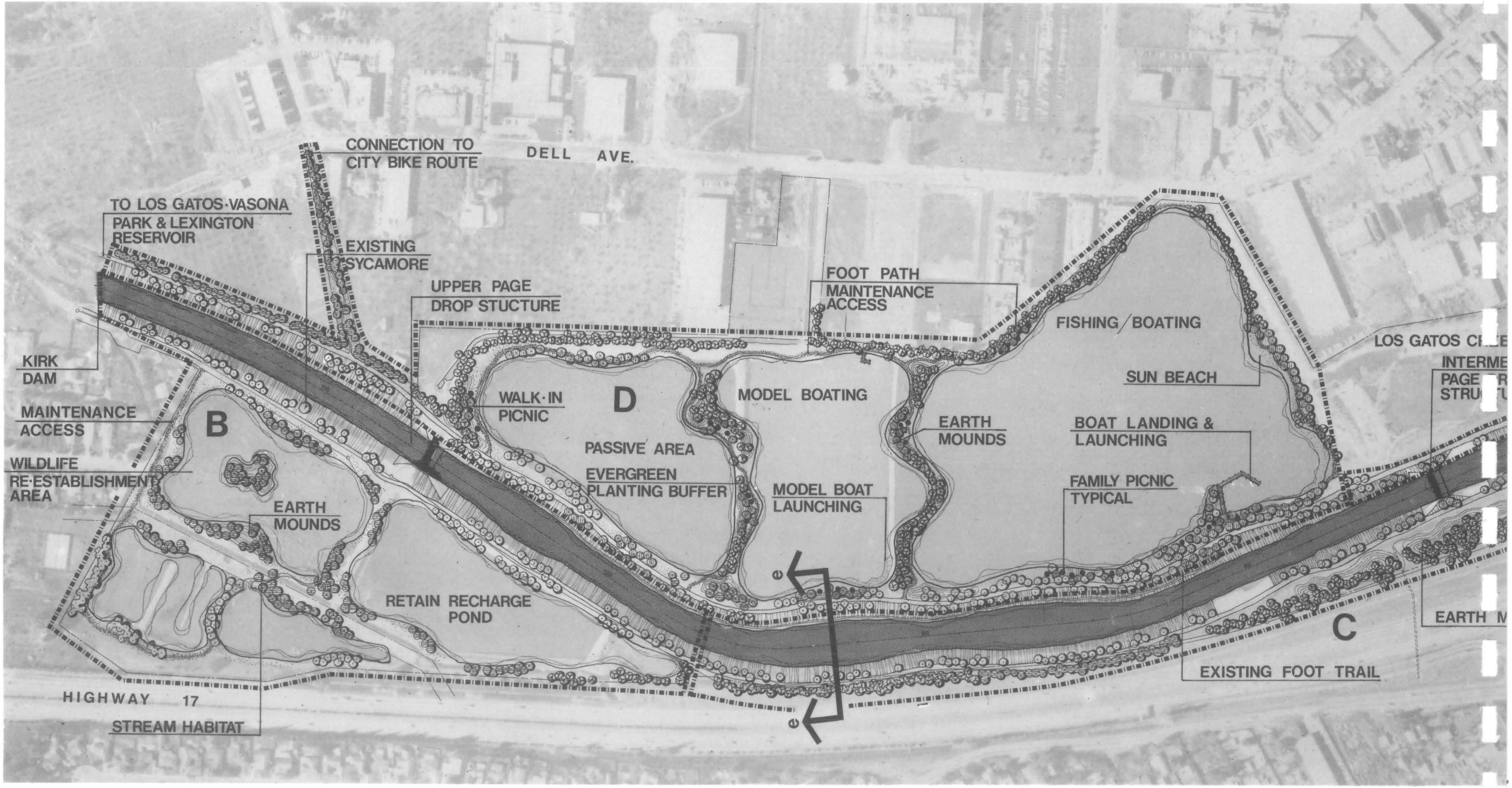
CONNECTION TO
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DELL AVE.
TO LOS GATOS-VASONA
PARK & LEXINGTON
RESERVOIR
EXISTING
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FOOT PATH
MAINTENANCE
ACCESS
FISHING/BOATING
LOS GATOS CREE
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LAUNCHING
PASSIVE AREA
EVERGREEN
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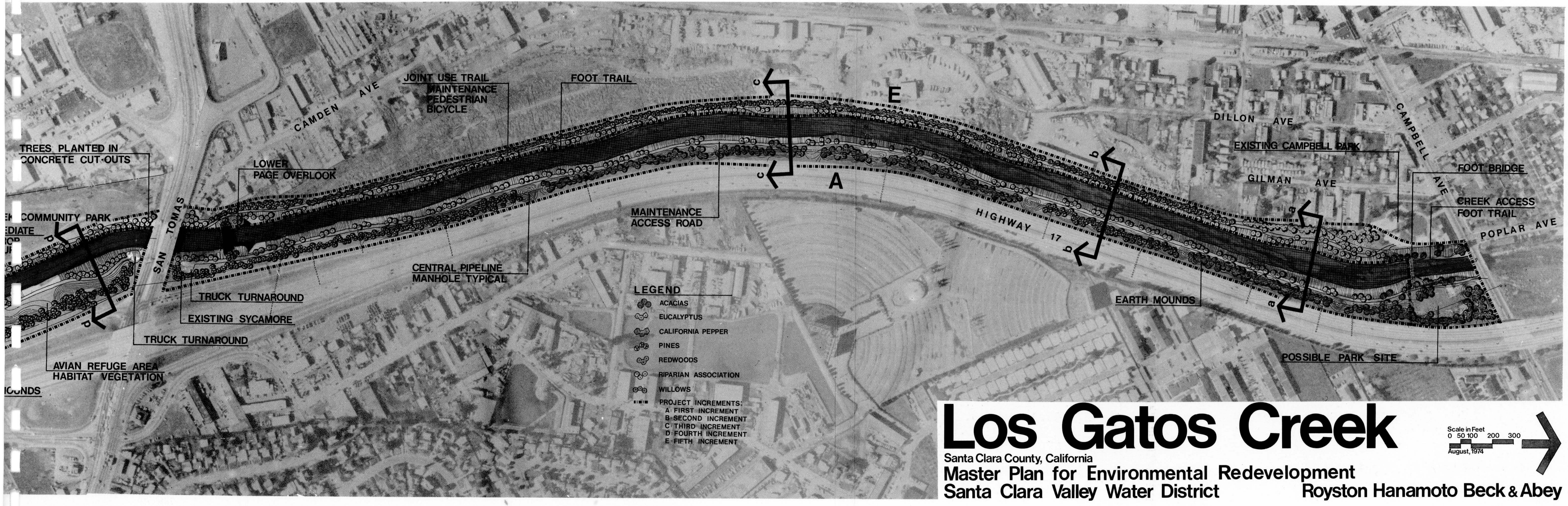
HIGHWAY 17
STREAM HABITAT



Los Gatos Creek

Santa Clara County, California

Master Plan for Environmental Redevelopment

Santa Clara Valley Water District

Royston Hanamoto Beck & Abey

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Appendix

Plant List

Trees

	Scientific Name Common Name	Deciduous Flowering Evergreen	Height Spread Annual Growth	Wet (W) Drought Tolerant (DT)	Root System Erosion Control Value (*)	Area Suitability Design Considerations	Spacing	Remarks
	Acer macrophyllum Big Leaf Maple	DF	30 - 100 30 - 60 Moderate	W	(*) Shallow	2, 3, 4, & 6 Grove Planting	15' - 25'	Native. Stream banks, California foothills. Small yellow flowers in drooping clusters. April - May, yellow fall color.
	Aesculus californica California Buckeye	DF	15 - 40 30 - 80 Moderate	DT	(*) Shallow Spacing	2, 3, & 6 Winter Form Mass Planting	15' - 20'	Native. Low, dry hills of coast ranges and along streams. Broad, open crown; generally dome like. May - June, flower plumes.
	Alnus rhombifolia White Alder	D	40 - 90 40 Rapid	W	(*) Shallow	2, 3, & 6 Grove Planting Quick Effect	5' - 15'	Native. Along streams of coast range valleys. Tall, straight trunk, ascending or spreading branches, dark green leaves.
Omit	Eucalyptus camaldulensis River Red Gum	E	80 - 120 40 - 80 Rapid	DT	Average depth	4 Grove Planting Screening	10' - 15'	Spreading crown with graceful sweeping branches. Tan, mottled trunk. As reinforcement to existing Eucalyptus planted adjacent to the creek.
Omit	Eucalyptus sideroxylon 'Rosea' Pink Iron Bark	EF	30 - 50 10 - 50 Rapid	DT	Shallow roots spread voraciously	4 Grove Planting Screening	8' - 12'	Slender, open headed upright tree. Red-brown bark. Widely planted in this area.
	Juglans californica Black Walnut	D	30 - 70 30 - 50 Moderate	DT	Deep roots	2 & 3 Mass Planting	8' - 10'	Native. Central Valley - Southern California. Often found along streams in Santa Clara County. Broad, round topped crown. Trunk unbranched for 10' - 20'.
Omit	Pinus halepensis Aleppo Pine	E	30 - 60 15 - 30 Moderate	DT	Deep roots	1 & 4 Screening Massing	12'	Widely adapted to this area. Open irregular crown, rugged character valuable in conditions of wind and heat.

AREA SUITABILITY:
1) Freeway Right-Of-Way
2) Creek Slopes
3) Wildlife Re-establishment Area
4) West Percolation Ponds
5) Right-Of-Way, West Side
6) Accent

Trees

Scientific Name Common Name	Deciduous Flowering Evergreen	Height Spread Annual Growth	Wet (W) Drought Tolerant(DT)	Root System Erosion Control Value (*)	Area Suitability Design Considerations	Spacing	Remarks
Pinus radiata Monterey Pine	E	40 - 80 30 - 50 Rapid	DT	Deep roots	1 & 4 Screening Massing	10' - 15'	Native to California Central Coast. Widely adapted to this area. Narrow compact tree, dark green foliage. Dependable, fast growth.
Pinus sabiniana Digger Pine	E	40 - 80 15 - 25 Moderate	DT	Deep roots	1 & 4 Screen Planting Mass Planting	12'	Native. Dry foothills bordering the central valleys and inner coast ranges. Grey-green needles, large cones, and forked trunk.
Platanus racemosa California Sycamore	D	40 - 50 40 - 70 Rapid	DT	Shallow spreading	1, 2, 3, & 4 Mass Planting	10' - 15'	Native. Stream banks and floodplain, and coast ranges. Often multi-trunk. At times, trunk leans horizontal or prostrate. Quick effect, winter form.
Populus fremonti Fremont Cottonwood	D	40 - 60 Rapid	DT	Shallow spreading	2 & 3 Grove Planting	5' - 10'	Native. Coast range valleys along streams. Tough, fast. Quick effect. Plant male trees only.
Populus trichocarpa Black Cottonwood	D	40 - 100 Rapid	DT	Shallow spreading	2 & 3 Grove Planting	10' - 15'	Native. Stream banks and valleys of mountain regions. Tall tree, broad crown.
Quercus agrifolia Coast Live Oak	E	30 - 70 60 - 100 Slow	DT	Deep roots	2, 3 & 4 Specimen Grove Planting	15' - 20'	Native. Lower mountain slopes, foothills and valley flats of the coast ranges. Wide spreading dense tree with rounded crown picturesque.
Quercus lobata Valley Oak	D	40 - 125 Moderate	DT	Deep roots	2, 3 & 4 Specimen Grove Planting	15' - 20'	Native. Inner and middle coast ranges. Large graceful tree - winter form.

AREA SUITABILITY:

1) Freeway Right-Of-Way
2) Creek Slopes
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5) Right-Of-Way, West Side
6) Accent

Trees

Scientific Name Common Name	Deciduous Flowering Evergreen	Height Spread Annual Growth	Wet (W) Drought Tolerant(DT)	Root System Erosion Control Value (*)	Area Suitability Design Considerations	Spacing	Remarks
Omit Robinia pseudoacacia Black Locust	DF	50 - 75 25 Rapid	DT	Average depth spreading	4 & 6 Accent Mass Planting	15' - 20'	Open branching habit. White flower clusters, May - June. Quick effect. Winter form.
Sambucus glauca Blue Elderberry	D	10 - 25 10 - 20 Rapid	W	Shallow	2 & 3 Group Planting	15' - 20'	Native. Native on canyon slopes, California foothills and stream banks. Good habitat tree or large shrub.
Omit Salix babylonica Weeping Willow	D	30 - 40 50 - 70 Rapid	W	Shallow spreading, voracious	4 & 6 Specimen Erosion Control Accent Planting	15' - 20'	Round headed, densely branched tree. Striking form. Quick effect. Active areas - water edge.
Salix lasiandra Yellow Willow	D	15 - 40 15 - 25 Rapid	W	(*) Shallow spreading roots	2 & 3	10' - 15'	Native. Occurs along permanent streams in the Great Valley, coast ranges and the Sierra-Nevada up to 4,000 foot elevation. Will attract small birds. Good for upper creek slope planting.
Schinus molle California Pepper	E	15 - 50 30 Rapid	DT	Shallow voracious roots	4 & 6 Specimen	20' - 25'	Broad, rounded crown with graceful, pendulous branches. Significant specimen exists near Campbell Avenue.
Sequoia sempervirens Coast Redwood	E	70 - 80 15 - 30 Rapid	W	Shallow	1 & 4 Screen Planting Mass Planting ?	10' - 15'	Native. Coast ranges from Northern San Luis Obispo County to Southwestern Oregon. Good, fast tree. Widely planted in this area.
Umbellularia californica California Laurel	E	20 - 75 20 - 40 Rapid	W	(*) Average root depth	2, 3 & 4 Grove Planting	15' - 20'	Native. Canyon slopes and along streams in coast ranges. Dense, clean tree - no pests.

AREA SUITABILITY:

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6) Accent

Shrubs

Scientific Name Common Name	Deciduous Flowering Evergreen	Height Spread Annual Growth	Wet (W) Drought Tolerant(DT)	Root System Erosion Control Value (*)	Area Suitability Design Considerations	Spacing	Remarks
Arctostaphylos densiflora 'Howard McMinn' Sonoma Manzanita	EF	30'' 4 - 6 Fast	DT	(*)	1, 2 & 4 Bank Planting	4' - 5'	Native - Sonoma County. Low spreading. Flowers white or pink.
Baccharis pilularis Dwarf Baccharis	E	12 - 24'' 3 - 6 Slow	DT	(*) Strong deep growing roots	1 & 2	3' - 4'	Native - Dense billowy mat of dark green. Low maintenance. Dependable ground cover.
Ceanothus thyrsiflorus Blue Blossum	EF	4 - 8 4 - 8 Fast	DT		1, 2 & 4	4' - 8'	Native - Outer coast ranges. Glossy dark-green leaves. Flowers from deep to washed-out blue.
Eriogonum fasciculatum California Buckwheat	EF	1 - 3 2 - 4 Moderate	DT	(*) Excellent erosion control	2 & 3 Bank Planting	Hydromulch	Native - Santa Clara foothills. Forms clumps of semi-upright stems with narrow leaves. White flower clusters, May - October.
Fremontodendron californicum Common Flannel Bush	EF	6 - 20 6 - 8 Rapid	DT		1, 2 & 3 Mass Planting	6' - 8'	Native - Foothills of the coast ranges. Yellow flowers, May - June. Good show.
Garrya fremontii Coast Silktassel	EF	4 - 8 8 - 10 Moderate	DT		1, 2 & 3 Mass Planting	6' - 8'	Native - Coast ranges. Lively, yellow-green leaves; fruit, purple or black.
Heteromeles arbutifolia Toyon	E	10 - 25 6 - 15 Moderate	DT	(*) Shallow spreading	1, 2 & 3 Mass Planting Bank Planting	6' - 8'	Native - Coast ranges, Sierra-Nevada foothills. Bright, red clustered berries, November - January. Showy - erosion control.

AREA SUITABILITY:

1) Freeway Right-Of-Way
2) Creek Slopes
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Shrubs

Scientific Name Common Name	Deciduous Flowering Evergreen	Height Spread Annual Growth	Wet (W) Drought Tolerant(DT)	Root System Erosion Control Value (*)	Area Suitability Design Considerations	Spacing	Remarks
Rhamnus californica Coffee Berry	E	6 - 10 10 - 15 Moderate	DT	(*) Deep roots	1, 2 & 3 Mass Planting	6' - 8'	Native - Low spreading or upright. Leaves shiny dark-green to dull green. Excellent habitat plant.
Ribes sanguineum Red Flowering Currant	DF	4 - 12 3 - 6 Moderate	DT		2 & 3 Accent Color	5' - 10'	Native - Coast ranges. Deep pink to red flowers, March - June. Dependable.
Rubus vitifolius California Blackberry	E	1 - 3 5 - 10 Rapid	DT	(*) Deep roots	2 Slope Planting	5' - 10'	Native - Open oak woodland.
Vitis californica California Wild Grape	D	1 - 2 4 - 6 Rapid	DT		2 Slope Planting	4' - 6'	Native.

AREA SUITABILITY:

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Creation of a Wildlife Habitat on Los Gatos Creek

The Santa Clara Valley Audubon Society
Los Gatos Creek Committee
June 20, 1974

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1.0 INTRODUCTION

In a letter of March 18, 1974 from Mr. Edwin Ferguson of the Santa Clara Valley Water District to Mr. Jerry Grow of the Santa Clara Valley Audubon Society, the Audubon Society was invited to "perform a study and recommend ways of reestablishing" a portion of Los Gatos Creek as a waterfowl preserve. The effort was to be part of a larger program to recontour and landscape Los Gatos Creek from Campbell Avenue to Kirk Dam. In the first meeting between Mr. Ferguson and the Audubon Society study committee, the objective of the program was expanded to include recommendations for native plants to be employed in all areas of the project.

This document is the Santa Clara Valley Audubon Society's report based on a brief study of the area. The data presented herein is drawn primarily from the backgrounds of the committee members in their respective professional specialities or areas of avocational interest.

The original members of the Audubon Society Los Gatos Creek Committee are:

- Douglas Cheeseman, Professor of Biology at DeAnza College
- Frank Farran, Field Trip Chairman for SCVAS and Chairman of the Committee
- Jerry Grow, Past Conservation Chairman for SCVAS
- Richard Hildreth, Director of Saratoga Horticultural Foundation
- Diana Matthiesen, Curatorial Assistant, San Jose State University Museum of Birds and Mammals
- David Nauer, Graduate Student in Biology at San Jose State University
- Clifford Schmidt, PhD, Professor of Biology at San Jose State University

In addition to the direct contributions of the committee members, recommendations were obtained from Robert Hassur, PhD, Associate Professor of Natural Science and Biology at San Jose State University & Leon Littlefield, Director of San Joaquin Valley National Wildlife Refuges. Finally, the committee is most indebted to Mr. Edwin Ferguson of the Santa Clara Valley Water District for his assistance in many areas and to other members of the staff of the Water District for typing and reproduction of the report.

The Water District has retained the landscape architectural firm of Royston, Hanamoto, Beck and Abey. Since they are most experienced and competent in landscaping programs of this nature, the Audubon Society Committee has made no attempt to specify detailed landscape design except where it is particularly pertinent to creation of the desired wildlife habitat. Our objectives, as time would permit, have been the following:

(a) To provide the necessary criteria for reconversion of two percolation ponds to wetland wildlife habitat.

(b) To suggest native trees, shrubs and herbacious plants for use throughout the area which will result in establishment of a rich biotic community simulating to a degree the original environment.

(c) To provide a list of birds presently inhabiting the area and a list of birds which can be expected a few years after landscaping. In addition, any significant observations in regard to other animals are presented. It is our intent that this information be used in the future to evaluate the success of the program.

(d) To furnish some basic "how to do it" information such as sources of native plants and some suggestions for their planting and care.

(e) To compile a bibliography from which more detailed information can be derived

This report is obviously directed toward the project at hand. However, it is the hope of the Audubon Society that the report, supplemented by the lessons which will be learned on the project, can be used on future projects of similar nature.

2.0 GRADING RECOMMENDATIONS (By Frank Farran)

The first step in any landscaping operation is grading. For the project at hand grading can be subdivided into four categories: (1) the grading necessary to provide both a sound barrier and esthetic interest along the freeway and (2) the grading associated with the wetlands area.

The grading for the sound barrier appears to involve no special wildlife habitat considerations. Since a relatively low north-south trending ridge is contemplated by the landscape architect,there would be no particular slope exposure considerations in planting the trees and shrubs recommended herein. There is one point, however, which should be made in regard to any grading along the freeway. At the southwest end of the project there are established Palo Verde and Chinese Elm trees along the freeway. These plants aren't included on the plant list in this report, but the point is that they are established. In order to save these trees, no grading should be done in this area and further landscaping should take them into account.

The grading of the wetlands area is quite critical to its success as a wildlife habitat. Figure 1 sets forth our recommendations. It derives from a number of considerations.

During warm weather algal growth can choke up a pond. Four things are suggested to minimize the problem. A maximum depth of 13 to 17 feet in both ponds is recommended. Secondly, except in the 0 to 2 foot deep "tule" areas, the pond bottom slopes down at the rate of .3 feet per foot thus minimizing the shallow water around the periphery of the pond. Thirdly, it is recommended that some of the percolation water available be circulated through the ponds as shown in Figure 1. Rough calculations show that the two ponds combined will be about 2½ acres in area and will contain a little over 600,000 cubic feet of water. A flow rate of 2 cubic feet per second (net of evaporation and percolation loss) will produce a complete change of water every 3½ days assuming uniform circulation. Since the circulation will not be uniform, some areas may have a water change every week or ten days, but this should still be adequate. Finally, the 0 to 2 foot deep "tule" areas are primarily in the direct circulation path. The net effect of these four features will be to minimize the amount of warm stagnant water in the summer months with resultant minimization of algae and mosquitoes.

The depth of the ponds is based on another condition in addition to algae control. That is, water any less than four feet deep will be taken over by cattails.

The stream connecting the ponds is a part of the circulation system as noted, but it will also provide a habitat for aquatic life which requires running water. The difference in level between the two ponds is appreciable (i.e. 2 to 3 feet by eyeball measurement). The kind of stream that is desired is one with a grade in the order of .002 feet per foot. Thus, it is recommended that either several riffles be built in the stream or that most of the drop be taken at the concrete dam at the outlet to the upper pond. The riffles, if employed, should be durably constructed of stone so that they won't erode away.

Detail design of the stream is the precinct of the landscape architect and the Santa Clara Valley Water District engineers. As a guide it should be noted that in order to have a biologically productive stream the water should be 3 to 6 inches deep and the stream should be at least 3 feet wide. The stream path should be replete with stones 6 inches to a foot in diameter to provide attachment surfaces for the invertebrates. The water velocity should be 2 to 3 feet per second (i.e. 1.4 to 2 miles per hour). Very rough calculations show that the specified 2 cubic foot per second flow rate combined with the .002 feet per foot drop and the above specified channel dimensions will yield this sort of flow rate, but this should be verified.

One of the objectives of the pond design is to provide a nesting place for water birds. The species that probably can be induced to nest there are Pied-billed Grebe, Mallard, Cinnamon Teal, Ruddy Duck and Coot. In fact it is likely that both Mallards and Coots presently nest in these ponds. The Pied-billed Grebe and Coot normally nest over water in or near cat tails. The Ruddy nests over water, but has a preference for bulrushes. The smaller pond with a deep open water center surrounded by tules is designed for these species. Mallards and Cinnamon

Teal nest on land, normally in tall grass or weeds. Such growth develops most readily around ponds that have gently sloping banks above the water level. Thus, it is suggested that the island be quite flat with most of its surface no more than 18 inches above the water surface. It would also be desirable to make a flat area no more than two feet above the water level at the northeast end of the large pond.

It is essential that the pond water level be kept quite constant (within a range of ± 4 inches). Fluctuating water levels, particularly in the late spring and summer, are inimical to development of marsh plant communities and to nesting birds. Thus, sufficient flow must always be maintained to more than compensate for percolation and evaporation.

Finally, it should be kept in mind that water in any form has an irrestible attraction for children. Sudden drop-offs in the ponds should be avoided for safety reasons.

3.0 PLANTING RECOMMENDATIONS

(W. Richard Hildreth)

There are a great many trees and shrubs which could be grown in the area which would provide good wildlife habitat. Plants native to areas with a similar climate could be grown with very little care. Examples of such plants are Olive, Carob and Peruvian Pepper. However, there seems to be little point in recommending "exotics" when there are so many excellent native plants. Thus, in Tables I, II and III we have recommended only plants native to California and, in most cases, the Bay Area. It is suggested that the landscape architect select from the lists such species as best conform with his general plan.

3.1 SUGGESTED PLANTING PROCEDURES

(W. Richard Hildreth)

3.1.1 Planting of Container Stock

Techniques similar to that depicted in "One-Sheet Answers (U.C. Agricultural Extension Service OSA #145), Planting Landscape Trees" are recommended. No more than 50% organic matter should be mixed with backfill soil. Mulch such as coarse redwood, fir bark or similar materials is fine ; but clean chips from commercial arborists operations could be used in this area. This latter material would probably be free. Such mulch should not contact trunk or main branches. Apply mulch after first watering. A tractor with 8"-18" wide soil auger would facilitate digging the holes.

3.1.2 Watering

Use breaker on end of hose to prevent washing soil from basin. Water schedule should be dictated by moisture condition of soil ball. Supplemental watering should be applied first summer following planting with perhaps some additional the following summer. Fall planting is suggested to take advantage of winter rains. Manually applied water is preferred to automatic irrigation systems.

3.1.3 Fertilizing

Supplemental fertilizer applications are not recommended unless parent soil is completely devoid of nutrients. If so, a slow-release type fertilizer is suggested.

3.2 SOME SPECIAL FACTORS TO CONSIDER IN PLANTING (By W. Richard Hildreth)

3.2.1 Overplanting

Overplanting initially with smaller sized plants may result in greater survival over more of the project area. Unit cost would be lower. If survival is higher than anticipated, overcrowdec specimens could be thinned out eventually. Larger sized specimens (5 gallons and up) of most native plants are not available.

3.2.2 Direct Seeding

Certain tree and shrub species may be established by direct seeding (see bibliography). Most annual, herbaceous and grass species could be planted by hydromulch techniques.

3.2.3 Delayed Planting

Some species may be easier to establish after microclimate has been modified by growth of initial plantings. Thus, additional plantings might be scheduled later in the project development. This would apply to the more herbaceous species and shade tolerant species.

3.2.4 Availability

Most of the trees, shrubs, groundcovers and vines listed are available periodically from nurseries in California. Quantities and sizes are often limited. Arrangements might be made with a grower to produce the materials on a contract basis.

3.3 MARSH PLANTS FOR WETLANDS (By Clifford L. Schmidt)

Given the appropriate wetland conditions, in time, some kind of marsh with a haphazard assortment of vegetational types will appear. Given the purpose of optimizing a wetland area for wildlife under a particular set of conditions, then we can attempt to determine the appropriate vegetation for that marsh.

There are a number of problems which may be encountered in development of a marsh. No matter what plant species are used to start the wetland area, there will be a succession or change of plants and animals present in time. The selected plant species themselves will change the environment in such a manner that they may well be succeeded by other plant species. Thus, it may be necessary periodically to attempt to slow or even stop a given successional series.

To provide a self-perpetuating source of food, cover and nesting for wildlife, a careful selection of plant species is necessary. Several criteria which will direct the selection of appropriate plant species are suggested:

1) A species which has a tendency to become weedy and overpopulate an area is to be avoided.
2) The selected species must provide food sources for various animals over a period of time within a year and from year to year.
3) The selected species need to be associated with various niches in the general habitat: some in deeper water; some in shallower water; and some on the margins of the wet area.
4) The species must genetically be compatible with this region. The selected ecotypes should be from a similar geographical location so that the general climatic regime is similar.

Water depth, pH, dissolved mineral content, temperature as well as the make-up of the substrate all must be considered. The partial list in Table IV of mostly local native plant species represents an attempt to satisfy these requirements for conditions in the Los Gatos Creek ponds.

3.4 DEALERS IN SEED AND NURSERY STOCK OF PLANTS NATIVE TO CALIFORNIA

The list below is adapted from a list published by the California Native Plant Society.

Saratoga Horticultural Foundation
Post Office Box 308
Saratoga, California 95070

Clyde Robin
Post Office Box 2091
Castro Valley, California 94546

Theodore Payne Foundation
10459 Tuxford Street
Sun Valley, California 91352

Native Plant Farm
3350 St. Helena Highway North
St. Helena, California 94574

Pecoff Brothers Nursery
9200 Pershing Drive
Playa del Rey, California 90291

Mistletoe Sales, Incorporated
247 West Alamar
Santa Barbara, California 93105

Wapumne Native Plant Nursery
8305 Cedar Crest Way
Sacramento, California 95826

Leonard Coates Nurseries, Inc.
2201 The Alameda
Santa Clara, California
(244-2362)

Roy Carter, Seedsman
Box 4006
14363 Bledsoe Street
Sylmar, California 91342

Taylor Nursery
547 Carpenteria Road
Box 214
Aromas, California 95004

Yerba Buena Nursery
19500 Skyline Boulevard
Redwood City, California 94062

Shop in the Sierra
Post Office Box 1
Midpines, California 95345

Skylark Nursery
6735 Sonoma Highway
Santa Rosa, California 95405

Forest Seeds of California
Post Office Box 561
Davis, California 95616

4.0 BIRDS AND OTHER VERTEBRATES WHICH PRESENTLY INHABIT THE AREA (By Diana Matthiesen & David Nauer)

We feel that a few preliminary comments are in order in regard to the vertebrate fauna in the project area. The area does sustain a small avifauna and the species listed below were in fact seen by us. The situation with respect to the other vertebrates (mammals, reptiles, amphibians, and fish) is less apparent. Only a systematic live-trapping effort could adequately determine the species present. We strongly recommend that such a trapping effort be made and that the results be included in a future revision of this report.

The project area represents a classical disturbed habitat with its consequent depauperate fauna; that is, the simplification of the habitat has eliminated the wide variety of niches that would be there naturally.

This avian checklist is the result of cursory observation and is in no way definitive. We do recommend that an exhaustive list be compiled as early in the project as possible. These lists will become extremely valuable for comparison with those in the years to come as the area becomes rehabilitated. It would be expected that the species number would increase three or four-fold as the natural habitats become reestablished.

Pied-billed Grebe
Common Egret
Snowy Egret
Mallard Duck
Scaup Duck (prob. Lesser)
Common Goldeneye
Ruddy Duck
Turkey Vulture
Red-tailed Hawk
American Coot
Killdeer
Yellowlegs (prob. Greater)
Sandpipers (prob. Western)
Ring-billed Gull
Forster's Tern
Caspian Tern
Rock Dove
Mourning Dove
Black Phoebe
Cliff Swallow
Violet-green Swallow
Rough-winged Swallow
Common Crow
Mockingbird
Starling
House Sparrow
Red-winged Blackbird
Brewer's Blackbird
House Finch
Song Sparrow

It is a curious fact that although there is abundant water in the project area, there appears to be few amphibians. We observed Pacific treefrogs and a large "pond" frog (probably a red-legged frog). The lack of moist ground vegetation and shade is probably a limiting factor for the amphibians here; however, this is the season of aestivation for most local amphibians, so we didn't expect to see many at this time.

Only by systematic seining would it be possible to determine what species of fish are present in the ponds. We did see mosquito fish in the stream, and children fishing were catching black crappie. We could speculate at length about what could be or probably is present in the ponds, but this hardly seems worthwhile.

The only mammal we observed was the Beechey ground squirrel, but one could probably expect to find the Norway rat, house mouse, California deer mouse, and possibly raccoon, oppossum, California vole,and one or more species of bat. Only a thorough live-trapping effort would suffice to present an accurate mammals list. As with the birds, we can predict that species diversity and abundance would increase with habitat improvement.

The only reptile we saw was the western fence lizard, but the garter snake and gopher snake probably also occur here. Because of the area's proximity to urban and suburban development with the consequent heavy predation by dogs and cats (to which reptiles are especially vulnerable), it seems unlikely that the kinds and numbers would approach that of the former wild condition even after habitat improvement.

5.0 CHECKLIST OF BIRDS WHICH CAN BE EXPECTED IN THE AREA THREE TO FIVE YEARS AFTER LANDSCAPING (By Frank Farran)

The checklist of birds shown in Table V has been adapted from the Santa Clara Valley Audubon Societies checklist for Palo Alto. Nomenclature is per the old 1957 A.O.U. checklist.

6.0 AQUATIC INVERTEBRATES WHICH WILL BE FOUND IN THE WETLAND AREA (By Douglas Cheeseman)

Table VI provides a partial list of aquatic invertebrates that may be found in restored natural ponds in Santa Clara County. It is assumed in making up this list that a small stream will be included in the project as recommended in Section 2.0.

7.0 PHOTOGRAPHS OF THE AREA (By D. Cheeseman)

The accompanying photographs were taken in June, 1974. Figure 2 shows where each picture was taken. The photos will provide an interesting comparison in years to come.

8.0 RECOMMENDATIONS

We do not present this report as a thorough evaluation of the problem at hand. As noted in Section 4.0, considerable further observation and study would be necessary to completely define the present fauna of the area. Such information, though not fundamental to the landscaping operation, would be of considerable value as a base line from which long term success of the program could be measured.

Secondly, as every homeowner knows, planting is only the first step in gardening. In the case at hand, much effort and diligence will be required in years to come to achieve the desired results. It will become apparent that certain plants will have to be replaced by other species. Other plants may be overly aggressive and require attention. Section 3.3 discusses such a problem which may occur with cattails. As shady areas develop due to the growth of trees, it will be appropriate to plant some of the hardier native shade plants. These are just a few of the problems which will develop with the plants.

Thirdly, to this point in this report, development of a wildlife habitat has been considered only in terms of landscaping. However, one major deficiency of any newly landscaped area from the standpoint of wildlife is lack of nesting sites, particularly for hole nesting birds and mammals. Small hole nesting birds and mammals depend on woodpeckers to do their carpentry; and woodpeckers seldom make a nesting hole in live wood. Larger creatures, such as raccoons, which den in tree cavities, depend on natural decay in dead or declining trees. At some time in the future a nesting box or nesting site program may be in order.

To facilitate the above three programs and similar efforts which may be required, it is suggested that the Audubon Society Committee be permitted to have a hand in the project as it develops.

Finally, in order to obtain scientific information from this program, it is recommended that the project area be open to groups from Scientific and Educational institutions to conduct studies. Dr. Clifford Schmidt of San Jose State University has suggested that he bring his plant ecology class to the area for study. Dr. Robert Hassur, also of San Jose State, has similarly indicated that he would be interested in bringing classes in various areas of biology to the area. Douglas Cheeseman, of De Anza has also made such a suggestion. Doubtless, other people teaching and working in fields of life science would be interested in studying the progress of the rehabilitation of Los Gatos Creek. Their studies would form the basis for a long term evaluation of the project.

9.0 CONCLUSIONS

The Santa Clara Valley Audubon Society is appreciative and pleased that it was asked to participate in the program to landscape Los Gatos Creek in a fashion which will provide a favorable wildlife habitat and waterfowl preserve.

Large public and private landscaping programs are certainly nothing new in the area. Wildlife preserves have been established or developed in California since the end of the last century. However, the combination of the two concepts in the restoration of a disturbed area with native plants is unique. We hope that the knowledge that is gained here can be applied to future similar programs in the Santa Clara Valley.

TABLE I
Trees and Larger Shrubs
(By W. R. Hildreth)

COMMON NAME	BOTANICAL NAME	PLANTING LOCATION	COMMENTS
Digger Pine	Pinus sabiana	1&2	A good habitat tree. Jays, Warblers.
Torrey Pine	Pinus torreyana	1&2	Will attract Chicadees & Nuthatches in winter.
Redwood	Sequoia sempervirons	1	
Incense Cedar	Libocedrus decurrens	1	Will attract Chicadees & Nuthatches in winter.
Yellow Willow	Salix lasiandra	3	Willows probably attract more small birds, than any other native trees.
Arroyo Willow	Salix lasiolepis	3	
Valley Willow	Salix lindsiana	3	
Calif. Black Walnut	Juglans californica	2	
Valley Oak	Quercus lobata	2	
Coast Live Oak	Quercus agrifolia	2	
Maul Oak	Quercus chrysolepis	2	
Blue Oak	Quercus douglasi	2	
Western Sycamore	Platanus racemosa	2	Good tree for area but loses 1st crop of leaves.
Islay	Prunus ilicifolia	1&2	
Box Elder	Acer negundo	2	
Blue Elderberry	Sambucus glauca	2	An excellent bird habitat tree.
Toyon	Photinia arbutifolia	1&2	
Coffee Berry	Rhamnus californica	2	A good bird habitat tree.
Calif. Laurel (Bay)	Umbellularia californica	2	
White Alder	Alnus rhombifolia	3	
Fremont Cottonwood	Populus fremontii	3	
Black Cottonwood	Populus trichocarpa	3	
Redbud	Cercis occidentalis	2	
Madrone	Arbutus merziesii	2	May be difficult to establish.
Flowering Ash	Fraximus dipetela	2	
Calif. Scrub Oak	Quercus dumosa	2	
Spice Bush	Calycanthus occidentalis	3	
Big Leaf Maple	Acer macrophyllum	3	
Catalina Ironwood	Lyonothamnus floribundus var. asplenifolius	1	

Footnotes: (1) Freeway screen (2) Area between freeway screen and top of channel (3) Margin of ponds and interconnecting stream

TABLE II
SHRUBS
(By W. R. Hildreth)

COMMON NAME	BOTANICAL	PLANTING LOCATION	COMMENTS
Red Berry	Rhamnus crocea	2	
Mt. Mahogamy	Cercocarpus betuloides	2	
Coast Silk Tassel	Garrya elliptica	2	Dioecious. Obtain plants grown from seeds.
Black Sage	Salvia melifera	2	
Pitcher Sage	Lepechinia calycina	2	
Sticky Monkey Flower	Diplacus auranticus	2	
Fuchsia-Flowered Gooseberry	Ribes speciosum	2	
Winter Currant	Ribes sauguineum	2	
Creek Dogwood	Cornus stolenifera	3	
Foothill Penstemon	Pensteman heterophyllus	2	
Pacific Ninebark	Physocarpus capitatus	3	
Coyote Bush	Baccharis pilularis ssp. consangulea	2	An excellent habitat plant.
Jim Bush	Ceanothus sorediatus	1 & 2	
Blue Blossom	Ceanothus thrysiflorus	1 & 2	
Sonoma Manzanita	Arctostaphylos densiflora "Howard McMinn"	2	
Manzanita	Arctostophylos manzanita	2	
California Wild Rose	Rosa californica	2	
Snowberry	Symphoricarpus mollis	2 & 3	
Western ChokeCherry	Prunus demissa	2	
Neven's Barberry	Barberis nevenii	2	
Oregon Grape	Mahonia aquifolium	2	
Brewer's Saltbush	Atriplex lentiformis	2	
Wild Buckwheat	Eriogonum fasciculatum	2	
St. Catherine's Lace	Eriogonum giganteum	2	
Santa Cruz Island Buckwheat	Eriogonum arborescens	2	
Wooly Sunflower	Eriophyllum lanatum	2	Direct seeding.
Golden Fleece	Haplopappus arborescens	2	
Silver Bush Lupine	Lupinus albifrons	2	Direct seeding.
Succulent Lupine	Lupinus succulentus	2	Direct seeding annual.
Bush Anemone	Carpenteria californica	2	
Southern Flannel Bush	Fremontia mexicana	1 & 2	
Bladderpod	Isomeris arborea	2	

Footnotes: (1) Freeway screen (2) Area between freeway screen and top of channel
(3) Margin of ponds and interconnecting stream

TABLE III
GROUND COVERS AND VINES
(By W. R. Hildreth)

COMMON NAME	BOTANICAL NAME	PLANTING LOCATION		COMMENTS
California Fuchsia	Zauschneria californica	2	3	
Coyote Bush	Baccheris pilularis 'Twin Peaks No. 2'	2	3	
Dutchmen's Pipe	Aristolochia californica	2	3	Vine deciduous
Chaparral Clematis	Clematis lasiantha	2	3	Vine deciduous
Hairy Honeysuckle	Lonicera hispidula	2	3	
California Grape	Vitis californica	2	3	Vine deciduous
Modesty	Whipplea modesta	2	3	
Yerba Buena	Satureja douglasii	2	3	
Sonoma Sage	Salvia sonomensis	2	3	

Footnotes: (1) Freeway screen (2) Area between freeway screen and top of channel
(3) Margin of ponds and interconnecting streams.

TABLE IV
MARSH PLANTS
(By C. L. Schmidt)

RECOMMENDED PLANTS (Family, genus, species, common name and growing period)	CHARACTERISTICS	RELATIVE VALUE
TYPHAGEAE		
Typha latifolia L. Broad-leaved Cattail (June-Oct)	Forms dense stands or beds, catching soil and thus starting succession.	Rootstocks and seeds are sources of food. Shelter and nesting cover are provided. Since this species encourages succession it may need some control. (One suggestion deals with mowing when heads are formed but not mature and a follow-up mowing about a month later....kills 75 percent.)
SPARGANIACEAE		
Sparganium eurycarpum Engelm. (June-Oct.) Broad-fruited bur-reed	Forms local colonies but not dense beds.	Seeds are of value to various ducks, marshbirds and shorebirds.
POTAMOGETONACEAE		
Potamogeton pectinatus L. (May-Oct.) Sego Pondweed	Widespread, most common species. Wholly submerged plant from thick matted rhizomes. Perennial by fleshy winter corms. Grows well under a variety of water conditions.	Plump nutlets appear in middle of July and are eagerly sought after. All parts of the plant are edible.
P. illinoensis Morong. (May-Oct.)		similar

TABLE IV
MARSH PLANTS
(By C. L. Schmidt)

(continued)

RECOMMENDED PLANTS (Family, genus, species, common name and growing period)	CHARACTERISTICS	RELATIVE VALUE
ZANNICHELLIACEAE		
Zannichellia palustris L. (Sept.-Dec.) Horned Pondweed	Widespread and common in fresh and brackish water. Submersed aquatic herbs from slender rhizomes.	Both nutlets and vegetative parts are eaten by birds.
ALISMACEAE		
Sagittaria latifolia Willd. (July-Oct.) Wappato, Broad-leaved Arrow-head	Emersed aquatic of shallow water. Perennial through the development of corms at the ends of rhizomes.	Seeds are eaten but the greater food value lies in the corm or tuber located in the soft mud.
GRAMINEAE		
Echinochloa crusgalli (L.)Beauv. (July-Dec.) Barnyard grass	Widespread on moist or wet soil. A pest in rice fields.	Seeds are important food for ducks and other birds.
CYPERACEAE		
Cyperus eragrostis Lam. (May-Oct.) Tall cyperus	Perennial sedge with short thick rhizomes and coarse fibrous roots, common.	Seeds of value to birds.
Eleocharis macrostachya Britton Common Spike-rush	Perennial spike-rush found in moist soil at edge of ponds.	The plant provides duck food.
Scirpus americanus Pers. (Apr.-Oct.) Three-square	Perennial bulrush with horizontal rhizome; growing around fringe of ponds. Instrumental in succession.	Seeds (achenes) of value to birds. Important nesting cover for the Ruddy duck.

TABLE IV
MARSH PLANTS
(By C. L. Schmidt)

(continued)

RECOMMENDED PLANTS (Family genus, species, common name and growing period.)	CHARACTERISTICS	RELATIVE VALUE
POLYGONACEAE		
Polygonum persicaria L. (June-Oct.) Lady's Thumb	Erect or decumbent annual, rooting at nodes often in large clumps. Common bordering wet places.	Seeds (achenes) of value to waterfowl, marshbirds, gamebirds and songbirds,
P. hydropiperoides Michx. (June-Oct.) Mild Water Pepper	Low, decumbent aquatic or amphibious perennial.	same as above
P. punctatum Ell. (June-Oct.) Water smartweed	Aquatic to amphibious perennial.	same as above One growing procedure suggests the seeding of *Polygonum* and *Echinochloa* onto moist mudflats over which water can be brought in fall.

Many other species could be added. Certainly more dicotyledonous plants might be added. However, this list is a start and other species will appear in time. The above species will at least provide a variety of food, habitat and cover initially.

Reference to "Flora of the Santa Cruz Mountains of California" by J. H. Thomas will provide information on local areas where the above plants may be found.

TABLE V
CHECK LIST OF BIRDS WHICH WILL BE FOUND IN AREA
(By Frank Farran)

Birds	Location	Spring	Summer	Fall	Winter
Grebe, Horned	M OW	**		**	**
Eared	M OW	**		**	**
Western	M OW	*		*	*
Pied-billed	M OW	**b	**	**	***
Cormorant, Double-crested	OW	*		**	**
Heron, Great Blue	OA R S	**	**	**	**
Green	M R S	*	*	*	*
Egret, Common	M OA R S	*	*	*	**
Snowy	M OA R S	*	*	**	**
Heron, Black-crowned Night	R M OA S	**	*	**	**
Bittern, American	M	*		*	*
Goose, Canada	OA OW	*		*	*
Mallard	M OA OW	***b	**	***	***
Gadwall	M OA OW	*	*	*	*
Pintail	M OA OW	*		*	**
Teal, Green-winged	M OA OW	*		*	*
Blue-winged	M OA OW	*		*	*
Cinnamon	M OA OW	**b	*	**	**
Widgeon, European				*	*
American	OW	*		*	*
Shoveler	M OA OW	*		*	*
Duck, Wood	M OW R	*	*	*	*
Duck, Ring-necked	OW	*		*	**
Canvasback	OW	*		*	*
Scaup, Greater	OW				*
Lesser	OW	**		**	**
Goldeneye, Common	OW			**	**
Bufflehead	OW	**		*	**
Duck, Ruddy	M OW	***b	*	***	***

TABLE V
CHECK LIST OF BIRDS WHICH WILL BE FOUND IN AREA
(By Frank Farran)

(continued)

Birds	Location	Spring	Summer	Fall	Winter
Merganser, Common	OW	*		*	**
Vulture, Turkey	F	**	**	**	*
Kite, White-tailed	F B OA	*		*	*
Hawk, Sharp-shinned	B C R	*		*	*
Cooper's	B C R	*b	*	*	*
Red-tailed	F	*	*	*	*
Red-shouldered	F R	*	*	*	*
Eagle, Golden	F				*
Hawk, Marsh	F OA	*		*	*
Hawk, Sparrow	B OA	**b	**	**	**
Quail, California	OA Sh	***b	***	***	***
Pheasant, Ring-necked	R OA Sh	*b	*	*	*
Rail, Sora	M	*		*	
Gallinule, Common	M OW				*
Coot, American	M OA OW	***b	***	***	***
Killdeer	OA S	**b	**	**	**
Snipe, Common	M OA S	*		*	*
Curlew, Long-billed	OA S	*		*	
Sandpiper, Spotted	S			*	*
Willet	S	**	*	***	***
Yellowlegs, Greater	S	*		*	*
Lesser	S			*	*
Sandpiper, Least	S			*	
Dunlin	S	*		*	*
Dowitcher, Short-billed	S	*		*	*
Long-billed	S	*		*	*
Sandpiper, Western	S	**		**	**
Godwit, Marbled	OA S	*		*	*

TABLE V
CHECK LIST OF BIRDS WHICH WILL BE FOUND IN AREA

(continued)

(By Frank Farran)

Birds	Location	Spring	Summer	Fall	Winter
Avocet, American	OA S	**	*	**	*
Stilt, Black-necked	OA S	**	*	*	*
Gull, Western	F OW S	*		*	*
Herring	F OW S	*		*	*
California	F OW S	**	*	**	**
Ring-billed	F OW S	***	*	***	***
Tern, Foster's	F OW S	**	**	**	
Caspian	F OW S	**	**	**	
Pigeon, Band-tailed	F B C	**b	**	**	**
Dove, Rock	F OA	**b	**	**	**
Mourning	B C F OA	**b	**	**	**
Owl, Barn	F	*	*	*	*
Screech	B	*b	*	*	*
Great Horned	B C F	*	*	*	*
Burrowing	OA	*b	*	*	*
Swift, White-throated	F	*	*	*	
Hummingbird, Anna's	B Sh	**b	**	**	**
Rufous	B Sh	*			*
Allen's	B Sh	**	**		*
Kingfisher, Belted	R S	**b	**	**	**
Flicker, Red-shafted	B C R OA	**b	**	**	**
Woodpecker, Acorn	B	*	*	*	*
Sapsucker, Yellow-bellied	B C R	*		**	**
Woodpecker, Hairy	B C R	*	*	*	*
Downy	B C R	*	*	*	*
Nuttall's	B R	*b	*	*	*
Flycatcher, Ash-throated	B	*b	*	*	
Phoebe, Black	R S	**b	**	**	**
Say's	OA	*		*	*

TABLE V
CHECK LIST OF BIRDS WHICH WILL BE FOUND IN AREA
(By Frank Farran)

(continued)

Birds	Location	Spring	Summer	Fall	Winter
Flycatcher, Western	B R	**b	**		
Pewee, Western Wood	B C	**b	**		
Flycatcher, Olive-sided	C	*b	*		
Swallow, Violet-green	B C F	**	**	**	*
Tree	F R	*		*	
Rough-winged	F S	*b			
Barn	F S	**	*	*	
Cliff	F S	**b	**	*	
Jay, Steller's	C	**		**	**
Scrub	B C Sh	***b	***	***	***
Crow, Common	F OA S B C	**	**	**	**
Chickadee, Chestnut-backed	B C R	**	*	**	**
Titmouse, Plain	B C	***b	***	***	***
Bushtit, Common	B C Sh	***b	***	***	***
Nuthatch, White-breasted	B C	**b	**	**	**
Creeper, Brown	C	*		*	*
Wrentit	Sh	**b	**	**	**
Wren, Bewick's	Sh	**b	**	**	**
Long-billed Marsh	M	**b	**	**	**
Mockingbird	B Sh	***b	***	***	***
Thrasher, California	SH	*	*	*	*
Robin	B C Sh	***b	*	**	***
Thrush, Varied	B Sh	*		*	*
Hermit	B C Sh R	**		**	***
Swainson's	R	*b	**		
Bluebird, Western	B OA	*b	*	*	*
Kinglet, Golden-crowned	B C				*
Ruby-crowned	B C R Sh	**		***	***

TABLE V
CHECK LIST OF BIRDS WHICH WILL BE FOUND IN AREA
(By Frank Farran)

Birds	Location	Spring	Summer	Fall	Winter
Pipit, Water	OA	*		*	*
Waxwing, Cedar	B C Sh	**		*	**
Shrike, Loggerhead	OA	*	*	*	*
Starling	B C	***b	***	***	***
Vireo, Hutton's	B Sh	*b	*	*	*
Solitary	B C	*b	*		
Warbling	B R	**b	***		
Warbler, Orange-crowned	B Sh	**b	**		
Yellow	B R	*b	*		
Myrtle	B C R	*		*	*
Audubon's	B C R	***		***	***
Black-throated Gray	B	*		*	
Townsend's	B C	*		*	*
MacGillivray's	R	*			
Yellowthroat	M R Sh	*b	*	*	*
Warbler, Wilson's	R	*b	*		
Sparrow, House	B C Sh	***b	***	***	***
Meadowlark, Western	OA	**b	**	**	**
Blackbird, Red-winged	M OA	***b	***	***	***
Tricolored	M OA			*	*
Oriole, Hooded	B R	*	*	*	
Bullock's	B R	***b	***	**	
Blackbird, Brewer's	B C	***b	***	***	***
Cowbird, Brown-headed	B C OA	**b	**	**	**
Tanager, Western	B C R	*		*	
Grosbeak, Black-headed	B C R	**b	**		
Finch, Purple	B C R	*	*	*	*
House	B C Sh	***b	***	***	***
Siskin, Pine	C	*		**	**
Goldfinch, American	OA R	*b	*	*	*
Lesser	OA R Sh	**b	**	**	**

TABLE V
CHECK LIST OF BIRDS WHICH WILL BE FOUND IN AREA
(By Frank Farran)

(continued)

Birds	Location	Spring	Summer	Fall	Winter
Towhee, Rufous-sided	B Sh	***b	***	***	***
Brown	B Sh	***b	***	***	***
Sparrow, Savannah	O A	*	*	*	*
Junco, Oregon	B C Sh	**	*	**	**
Sparrow, Chipping	B	*	*		
White-crowned	B R Sh	**		**	***
Golden-crowned	B R Sh	**		**	***
Fox	R Sh	*		*	**
Song	R	***b	***	***	***

Location Symbols

B	Broad leaved trees such as oak, black walnut, sycamore, and California laurel
C	Coniferous trees
F	Flying over
M	Marsh (cattails and bulrushes)
R	Riparian habitat (willows, alders, and cottonwoods adjacent to ponds and streams)
OA	Open areas of grass or gravel
OW	Open water
S	Streams and shore of ponds
Sh	Shruby growth and dense thickets in dry areas

Frequency Symbols

***	Abundant to common
**	Fairly common to uncommon
*	Rare
b	Breeds

TABLE VI

AQUATIC INVERTIBRATES WHICH WILL BE FOUND IN THE WETLAND AREAS

(By Douglas Cheeseman)

Phylum Protezoa (Single Cell animals)-
Representatives of three Classes:
Mastigophora, Sarcodina, and Sporozoa

Phylum Platyhelminthes (Flat Worms) -
Class Turbellaria, Dugesia sp. (planaria)

Phylum Nemertea - Prostoma sp.
(proboscis worm)

Phylum Gastrotricha-Order Chaetonotoidea

Phylum Rotatoria (Rotifers) Class
Digonota and Class Monogonota

Phylum Nematoda (Roundworm)
Phasmidia, Orders Phabditida and Enoplida.

Phylum Bryozoa (Moss animals) - Class
Gymnolaemata and Class Phylactolaemata

Phylum Annelida (Segmented worms)
Classes Oligochaeta and Hirudinea (leaches)

Phylum Arthropoda - Class Crustacea -
Many orders including: Anostraca (fairy
shrimps), Cladocera (water fleas),
Podocopa (seed shrimps), Eucopepoda
(Copepods), Isopoda (sow bugs),
Amphipoda (scuds), Decapoda (fresh
water shrimps, crayfish).

Class Arachnoidea- Order Hydracarina
(water mites).

Class Insecta - The Following orders may
be found: Diptera, Trichoptera,
Plecoptera, Ephemeroptera, Coleoptera,
Collembola, Hemiptera, Lepidoptera,
Megaloptera

A list of genera or families of some of
the orders that may be found:

Order Collembola (Springtails), Genera
Onychiurus, Xenylla, Achorutes, Anurida,
Folsomia, Entomobrya, Smynthurides.

Order Ephemeroptera (Mayflies), Genera
Siphlonurus, Callibaetis, Choroterpes,
Tricorythodes, Hexagenia, Ephemerella.

Order Odonata (Dragon and Damselflies),
General Octogomphus, Gomphus, Aeshna,
Tetragoneuria, Erythemis, Leucorrhinia,
Tarnetrum, Sympetrum, Belonia, Libellala,
Platyhemis, Pantala.
(Damselflies): Genera Archilestes,
Lestes, Enallagma, Ischnura.

Order Hemiptera (True bugs), Families:
Corixidae, Notonectidae, Naucoridae,
Belostomatidae, Nephidae, Gerridae,
Veliidae, Saldidae.

Order Trichoptera (Caddis flies), Families
Hydropsychidae, Limnephilidae,
Leptoceridae.

TABLE VI

AQUATIC INVERTIBRATES WHICH WILL BE FOUND IN THE WETLAND AREA

(By Douglas Cheeseman)

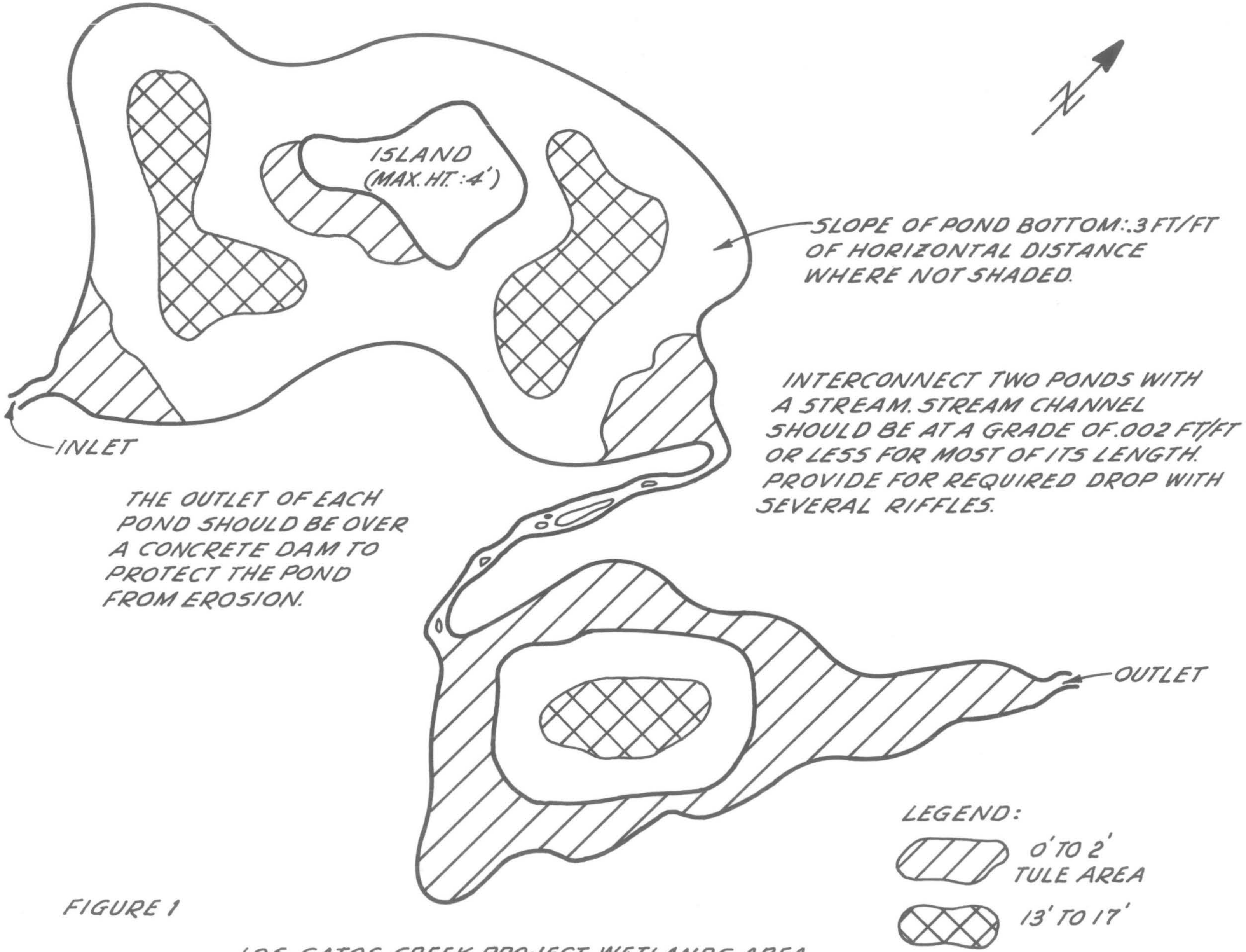
Order Coleoptera (Beetles), Families Hydropsychidae, Limnephilidae, Leptoceridae

Order Diptera (Flies), Families: Tipulidae, Psychopidae, Blephariceridae, Culicidae, Dixidae, Simuliidae, Tenipedidae, Heleidae, Stratiomyidae, Tabanidae, Dolichopodidae, Empididae, Syrphidae, Ephydridae, Sciomyzidae, Muscidae.

Phylum Mollusca

Class Gastropoda (Snails), Orders Ctenobranchiata, Aspidobranchia, Pulmonata.

Class Pelecypoda (Clams) Families Unionidae, Sphaeriidae.



SLOPE OF POND BOTTOM: .3 FT/FT OF HORIZONTAL DISTANCE WHERE NOT SHADED.

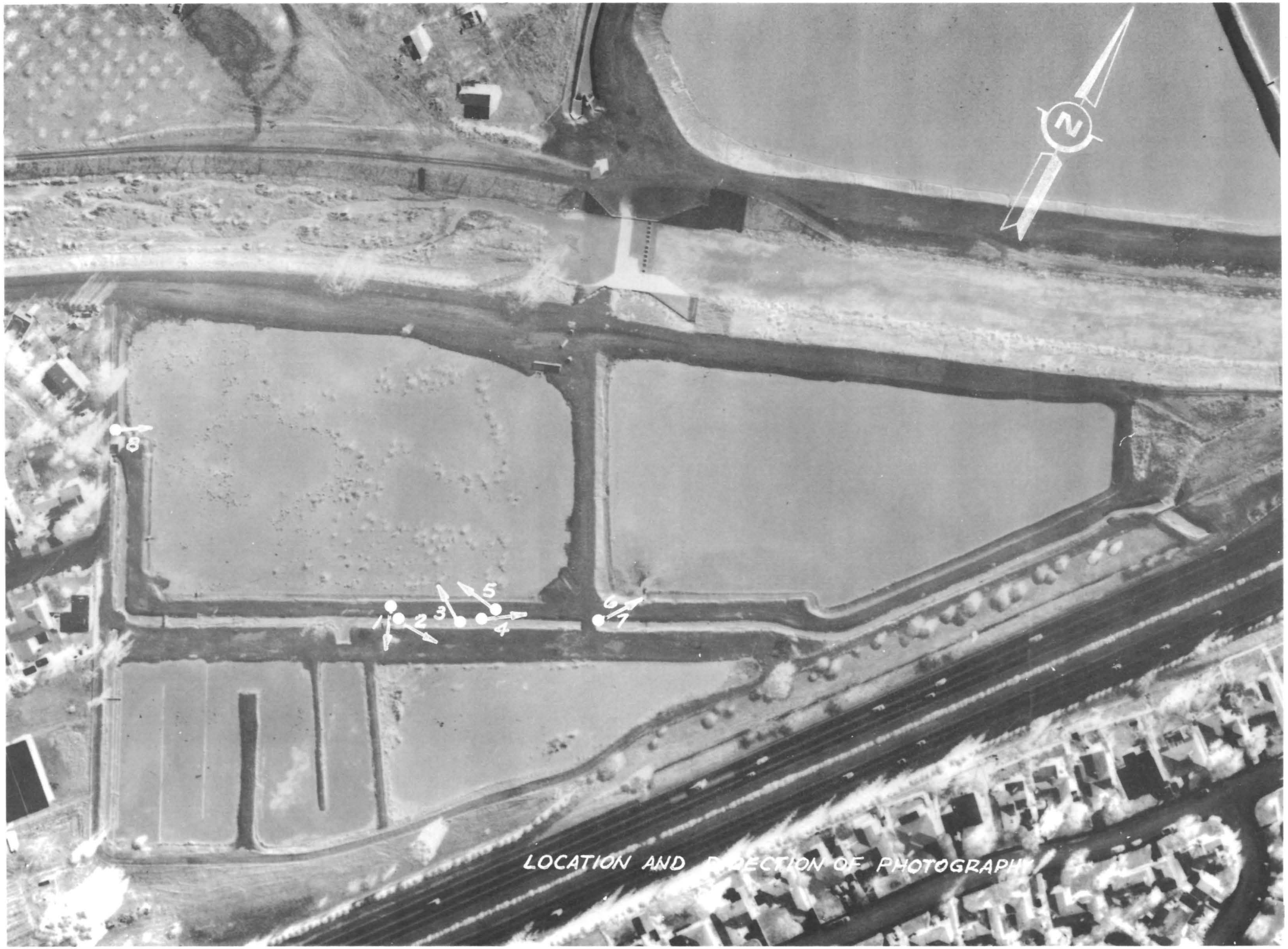
INTERCONNECT TWO PONDS WITH A STREAM. STREAM CHANNEL SHOULD BE AT A GRADE OF .002 FT/FT OR LESS FOR MOST OF ITS LENGTH. PROVIDE FOR REQUIRED DROP WITH SEVERAL RIFFLES.

THE OUTLET OF EACH POND SHOULD BE OVER A CONCRETE DAM TO PROTECT THE POND FROM EROSION.

FIGURE 1

LOS GATOS CREEK PROJECT WETLANDS AREA

F. FARRAN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LOCATION AND DIRECTION OF PHOTOGRAPHY

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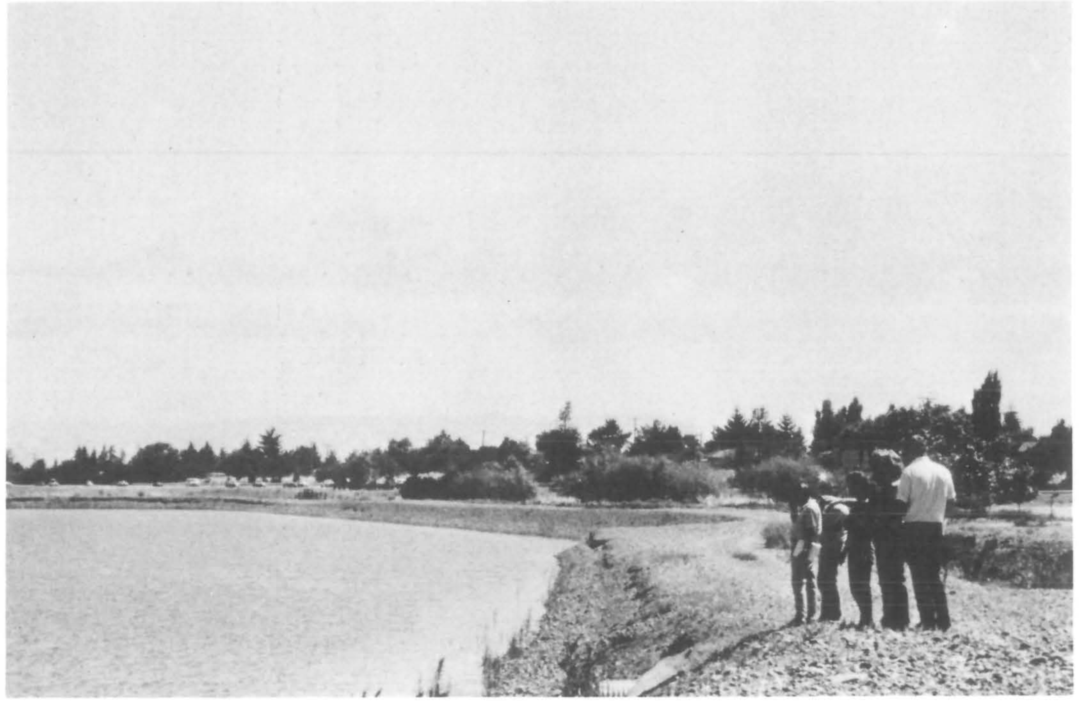

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Douglas Cheeseman, of De Anza College Cupertino, California, has a series of lists and sketches pertaining to an excellent environmental study area containing a biologically productive pond and stream.

ADDENDUM

During the night of 29 June 1974 a line of about 60 traps was operated in the area adjacent to the ponds where the wetlands are to be established. The only mammal caught was a house mouse.

Additional vertibrates which were observed in the area at this time and on a visit on June 24 were western toad, bullfrog, green heron, black-crowned night heron, and lesser goldfinch.

Cost Estimate

The following estimate is divided into five increments, A thru E, as marked on the Master Plan drawing on page 24. Unless otherwise noted, the costs were estimated as if all work were to be done by private contractors, and the unit costs are based on June 1974 construction prices. The estimate as a whole reflects the development value of the project. It is realistic to assume that cost savings can be generated by:

1. Project phasing and coordination.
2. Grant acquisition and sharing of costs with other agencies.
3. Volunteer labor and material programs.

	Project Increment A				Project Increment B			
ITEM	QUANTITY	UNIT COST	SUBTOTAL	TOTAL	QUANTITY	UNIT COST	SUBTOTAL	TOTAL
Grading - roll tops of creek channel sides	12,000 c.y.	$ 2.00	$24,000		3,500 c.y.	$ 2.00	$ 7,000	
Earthwork and Grading - on-site soil	*112,000 c.y.	.50	56,000		24,500 c.y.	2.00	49,000	
Creek Channel Re-alignment	12,500 c.y.	2.00	25,000		5,000 c.y.	2.00	10,000	
Drainage - metal pipe and inlet structures	600 ft.	13.00	7,800					
Hydroseed - native grasses and flowers	19 acres	500.00	9,500		10 acres	500.00	5,000	
Trees - one gallon can	800	5.00	4,000		500	5.00	2,500	
		Subtotal 25% Contingency	126,300 32,000			Subtotal 25% Contingency	73,500 18,000	
				$158,300				$ 91,500
Annual Maintenance		Lump Sum	18,000			Lump Sum	6,000	
Establishment Maintenance - three years		Lump Sum	22,000			Lump Sum	14,000	
		Subtotal 25% Contingency	40,000 10,000			Subtotal 25% Contingency	20,000 5,000	
				$ 50,000				$ 25,000
Park Development - bridge, boat docks, picnic beach, picnic tables, benches, wildlife area, bicycle paths		Lump Sum Including 25% Contingency		$ 60,000		Lump Sum Including 25% Contingency		$ 40,000
		GRAND TOTAL INCREMENT A		$266,300		GRAND TOTAL INCREMENT B		$156,500

* This item is based on the assumption that free fill is available. If soil is purchased, the estimated additional cost is approximately $500.000.

	Project Increment C				Project Increment D			
ITEM	QUANTITY	UNIT COST	SUBTOTAL	TOTAL	QUANTITY	UNIT COST	SUBTOTAL	TOTAL
Grading - roll tops of creek channel sides	7,000 c.y.	$ 2.00	$14,000		7,500 c.y.	$ 2.00	$15,000	
Earthwork and Grading - on-site soil	26,000 c.y.	2.00	52,000		25,000 c.y.	3.00	75,000	
Creek Channel Re-alignment	5,000 c.y.	2.00	10,000		5,000 c.y.	2.00	10,000	
Drainage - metal pipe and inlet structures	300 ft.	13.00	3,900					
Hydroseed - native grasses and flowers	11 acres	500.00	5,500		8 acres	500.00	4,000	
Trees - one gallon can	400	5.00	2,000		800	5.00	4,000	
	Subtotal 25% Contingency		87,400 22,000		Subtotal 25% Contingency		108,000 27,000	
				$109,400				$135,000
Annual Maintenance		Lump Sum	6,000			Lump Sum	18,000	
Establishment Maintenance - three years		Lump Sum	11,300			Lump Sum	22,000	
	Subtotal 25% Contingency		17,300 4,400		Subtotal 25% Contingency		40,000 10,000	
				$ 21,700				$ 50,000
Park Development - bridge, boat docks, picnic beach, picnic tables, benches, wildlife area, bicycle paths	Lump Sum Including 25% Contingency			$ 30,000	Lump Sum Including 25% Contingency			$175,000
	GRANT TOTAL INCREMENT C			$161,100	GRAND TOTAL INCREMENT D			$358,000

	Project Increment E				Project Total			
ITEM	QUANTITY	UNIT COST	SUBTOTAL	TOTAL	QUANTITY	UNIT COST	SUBTOTAL	TOTAL
Grading - roll tops of creek channel sides	14,000 c.y.	$ 2.00	$28,000		44,000 c.y.	$ 2.00	$ 88,000	
Earthwork and Grading - on-site soil					187,500 c.y.	Varies - See Increments	232,000	
Creek Channel Re-alignment					27,500 c.y.	2.00	55,000	
Drainage - metal pipe and inlet structures					900 ft.	13.00	11,700	
Hydroseed - native grasses and flowers	7 acres	500.00	3,500		55 acres	500.00	27,500	
Trees - one gallon can	600	5.00	3,000		3,100	5.00	15,500	
	Subtotal 25% Contingency		34,500 8,500		Subtotal 25% Contingency		429,700 110,000	
				$ 43,000				$ 539,000
Annual Maintenance		Lump Sum	6,000			Lump Sum	54,000	
Establishment Maintenance - three years		Lump Sum	17,000			Lump Sum	86,300	
	Subtotal 25% Contingency		23,000 5,800		Subtotal 25% Contingency		140,300 35,000	
				$ 28,000				$ 175,300
Park Development - bridge, boat docks, picnic beach, picnic tables, benches, wild-life area, bicycle paths	Lump Sum Including 25% Contingency			$116,000	Lump Sum Including 25% Contingency			$ 421,000
			GRAND TOTAL INCREMENT E	$187,800			PROJECT GRAND TOTAL	$1,136,000